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ORIGINAL ARTICLES

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Editor of the Month

ARTHUR L. WATKINS, M.D.

Boston

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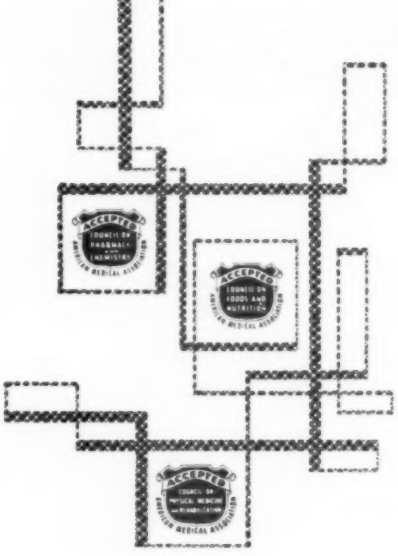

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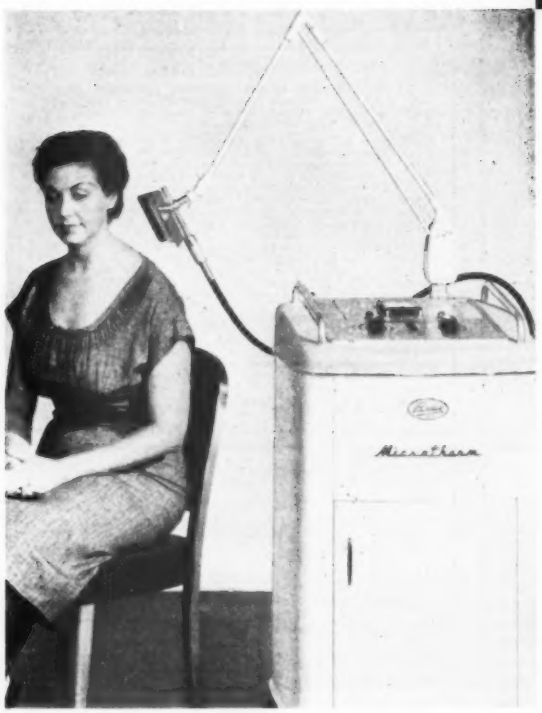

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The Physiatrist: His Problems, Perspective and Prospects

Wm. Benham Snow, M.D.
New York City

It has been my privilege to work in the field of Physical Medicine for thirty-four years. I was fortunate to start at the side of an early teacher — my revered and conscientious forebear. Some of the older members of this group may have been privileged to know the elder Doctor Snow. I have seen the combined efforts of our membership develop this specialty into the state of acceptance and dignity and recognition of which we are proud today. Before the title "physiatrist" was dreamed of, men in this work were banded together. Our parent association was a forum for the appraisal and improvement of our knowledge regarding the modalities employed in treatment. The foundations of present-day Physical Medicine were propounded by the succession of early workers. Not infrequently, the treatment instituted by these pioneers roused fear among their professional colleagues. In review of the very early literature, we find that, considering the general understanding of disease mechanisms of those days, the efforts of these early workers demonstrated some of the most rational and progressive thinking of the time.

The early workers in Physical Medicine were as a rule little appreciated. The concepts they defended were not generally welcomed in cloistered institutions and were often rejected without investigation. The group was small and considered something like crickets in the house. Crickets may be considered a nuisance and they are difficult to eliminate as they chirp their clear song undismayed by cold, or dark, or disdain. How many have taken up their song today! The persistency of those early leaders in the field who pressed forward with the courage of conviction, has attained for this specialty an important and dignified position in the field of medicine and surgery.

Until teaching began in the complex and integrated pattern we recognize in the great medical centers today, Physical Medicine did not have the primary purpose it has now. Early workers were practitioners who had a special interest in physical modalities. They adopted physical measures along with other forms of treatment in helping their patients. They practiced general medicine, but they did not represent the "physiatrist" of today. The physiatrist now is trained in the use of Physical Medicine as a specialty which often carries the restoration of the patient further than definitive general medical or surgical therapy. He is consulted for guidance by the rest of the profession as to what measures are most applicable and most beneficial to the patient.

The Committee on Advances in Education this year has been particularly concerned that we improve and standardize to a greater extent the training of young physicians entering this field of practice. The qualifications and training required for Board acceptance are continually the subject of scrutiny. Standards must and will be kept at the highest level, admitting only the best-trained personnel into our field.

As one of the youngest specialties, we are naive enough to indulge in self-approbation. Physical Medicine is one of the most satisfying of all specialties, for many reasons. It offers essential assistance to the rest of the medical profession and is increasingly sought after. It is a broad specialty in that the whole patient is at all times under consideration in our rehabilitation program. It does not have the limitations inherent in many of what might be called the

Presidential Address: Read at the Thirty-second Annual Session of the American Congress of Physical Medicine and Rehabilitation, Washington, D.C., September 8, 1954.

anatomical specialties. To those physicians interested in research, this specialty, closely allied to the physical sciences, offers superb opportunity for basic as well as clinical investigation. We have patients of all ages — from pediatric to geriatric. We are, however, seldom required to fill out death certificates.

Severe disabilities and chronic conditions which make up a great part of our daily practice give contact with many people low in spirit. These persons are hungry for encouragement and reassurance; they are most grateful for any service which increases their comfort and usefulness. One of our most precious privileges and at the same time a responsibility, is to improve the morale of the patients under our care.

The patience required in dealing with the people who are sent to us and whose ailments often have a strong functional component, attracts to our specialty men of c h e e r f u l, sympathetic demeanor. Combine this with the necessity to cooperate with general practitioners, specialists, and ancillary workers in the field of Rehabilitation, and we assemble qualities in men which make for stoutheartedness and good fellowship. These are some of the reasons why I work in this specialty and why we may look ahead confident of strong and continued growth.

My audience this afternoon is fully aware of the concept of the rehabilitation center. Achievements attainable by properly integrated efforts of a group of rehabilitation workers under medical direction are matters of record. The timing, the type of treatment, its extent and the counsel and guidance rendered each individual patient will vary.

The word "rehabilitation" has gained currency and popularity. At present there is a tendency for purely convalescent institutions without efficient medical guidance or adequate treatment facilities to accept patients for rehabilitation. They do no credit to our specialty!

It behooves this organization to describe clearly the necessary elements of a rehabilitation unit. We must define the type of cases a rehabilitation center can best serve, the time at which these patients should reach the center, and state clearly what goals may hope to be attained.

In an attempt to set up criteria we must consider the acute traumatically disabled group, the reversible neurological cases, the victims of chronically disabling diseases, the degenerative diseases associated with aging, and the treatment of children crippled from whatever cause. The requirements in this varied group of patients will differ widely.

In reviewing these subjects for physical rehabilitation, it is apparent that convalescent and custodial institutions do not fall in the category of the rehabilitation center. As customary to new advances, the pendulum of rehabilitation has swung wide of the arc in which it will finally operate. Confusion is created and progress delayed by the clash of many conflicting interests. Many branches of medicine are involved, and other professional groups, each with their own subprofessional aids, are represented. Many of these at the moment have brilliance and importance out of proportion to logical function. Better integration is necessary if efficient and economical rehabilitation is to be performed. The enthusiastic support of the rest of the profession to whom we look for patients will come when such clarification is made. All medicine is interested and eligible to participate in Rehabilitation. Simple cases do not require the services of rehabilitation units per se. Regardless of the degree of need for rehabilitation, the program for the patient being rehabilitated must be under medical control. We in the specialty of Physical Medicine and Rehabilitation have the special training and dedication to exercise this control. No other medical group is by basic training and experience in a position to carry these plans to fruition.

It is a curious human heritage that individuals or groups, as they develop stature and importance, are often subject to unfair attack. Last year we received this distinction. Through no fault

of our own — unless enthusiasm, singleness of purpose, and vigor are faults — we were challenged by what might be termed our nearest relation. The issues have been examined and the essential truths have been made clear. With the unemotional sifting of the pro's and con's we feel certain that the unhappy incident will soon pass. In its place will come improved basic understandings and the harmony necessary to serve our patients best.

During the year we have met with specialists in other large service groups. We have discussed our mutual problems and will probably be well organized to attack new joint problems which arise from time to time in hospital organization and practice.

Our committees specially designated to study entities within the rehabilitation field — as those on geriatrics, psychiatry, rehabilitation centers, health resorts and spas — have succeeded in establishing contact with other national groups to seek improved understanding through joint effort.

Throughout the year, new facilities and financial resources for training of residents, fellows and ancillary workers in Physical Medicine have become available to us. For these we are most grateful.

The program of this Congress meeting, the Society, and the Instruction Seminar preceding these meetings stands out as one of the best we have ever undertaken. To those responsible, our congratulations and our thanks!

Before closing, I wish to commend especially the members of the organization who were assigned to committee work this year, for the fine cooperation given me and the progress they have made. To preside over this group has been a stimulating experience and a privilege for which I am everlastingly grateful.

The Use of University Facilities in a Broad Rehabilitation Program for the Disabled

Ralph E. Worden, M.D.
and
Kenneth W. Hamilton, B.S.
Columbus, Ohio

Rehabilitation is one of the emerging ideas and changing concepts of the Twentieth Century. If we conceive it as broadly as we must for the handicapped person, rehabilitation becomes in effect those experiences which provide for him the opportunity to equip himself with whatever he, as an individual, may need in order to regain his highest degree of functional independence. If our purpose is to help him pull his own weight as an independent member of society, then the specific services which may be needed in an individual instance are too many to enumerate. However, they can be divided into three principal areas in accordance with present day concepts. These are: (1) The restoration to the highest level of physical function and physical independence that medical skills can provide; (2) the restoration of the rehabilitee as a socialized being with full equality, who feels that he "belongs", whose opinions may merit respect and who feels that he can be a member of a family and a member of the community, and whose satisfactions in life are not mostly vicarious, and (3) the restoration of the rehabilitee as an economically independent person engaged in purposeful and constructive activity at his highest level of employability.

Read at the Thirty-first Annual Session of the American Congress of Physical Medicine and Rehabilitation, Chicago, September 3, 1953.

Director, The Rehabilitation Center, Ohio State University, Columbus, Ohio.

Associate Director, The Rehabilitation Center, Ohio State University, Columbus, Ohio.

Physical Medicine and other medical services, then, should be seen as an integral part of a total experience for a patient, rather than a phase of the total experience made available to the handicapped individual. At the onset of disability, measures affecting ultimate physical recovery need to be carefully studied, not only from the physician's point of view, but also as they may relate to this essential concept of rehabilitation as an integrated service. Measures that prevent soft tissue contractures, osteoporosis, decubiti, unnecessary atrophy of muscle, and metabolic changes are measures that enhance physical restoration and as such are preventive medicine. These measures should be taken early in a situation in which they are inter-dependent with the psycho-social and vocational-economic measures toward total rehabilitation.

It seems to us that the problem facing a university rehabilitation center is also its greatest opportunity. That is, to make these medical services, in combination with the psycho-social and vocational services, effective supplementations of each other and available on a meaningful basis to the patient and his family. The campus setting is a rich potential of such resources.

Recently a disabled but observant patient who was being rehabilitated asked, "Why do some people get well so easily, and others get well so hard?" She had observed two individuals receiving rehabilitation services, and although they had had the same disability, one quickly moved from the ranks of the disabled while the other seemed destined for a life of complete dependency. The answer appears simple. One had retained attitudes and motivation which were conducive to rehabilitation—the other had not.

While we agree that the level of motivation is perhaps the critical factor in predicting the success or failure of the patient's rehabilitation, we also recognize that motivation as we see it is not a single entity. Indeed it is a complex of cultural, physiological, psychological, and social factors. It is for this reason that we recognize and accept the fact that effective rehabilitation services are predicated on the inter-dependence of the skills and resources that can be made available to the purposes of a handicapped person. Since motivation is not entirely a question of the patient's will or volition, we face the responsibility of enlisting the highest professional skills for this purpose. Not the smallest factor in influencing motivation-attitude is the physical setting and the group living on a dormitory basis which the university can provide. This is quite a different setting from the impersonal attendance at an out-patient clinic, and might be described as "environmental therapy." Effective use of the setting in which rehabilitation is practiced and its studied control to influence patients to the desired end of motivation is only beginning to be understood. But here again the university campus setting seems to be at a conspicuous advantage.

In approaching the question of the adequacy of social services, it is stipulated at once that they must be coordinated with existing health and welfare programs affecting the patient and his family in his home community. They must also be cognizant of the needs and requirements of the employer and the labor union. The social setting in which the patient is found with its nuance of social attitudes, family sanctions, and levels of aspiration is also critical in this respect. These things are realities which limit what is available and what can be done by the rehabilitation team because they limit what the patient will accept and because they are real and positive to him and to his family. Therefore, any technical knowledge or skill possessed by the staff beyond the point of the patient's willingness to accept such skills or services is only of theoretical or at best potential value in rehabilitation. To increase the patient's acceptance, we must not only know the disability, but also the person on whom it has been inflicted. Here we raise the question of the handicap frequently as quite distinct from the disability. Like motivation, the handicap is a highly

individualized and complex thing, as might be suggested when we compare an instance in which the professional violinist and a truck driver may have each suffered an amputation of the distal joint of the left index finger. In the instance of the truck driver, we may be dealing only with a disability as an inconvenience, while in the case of the musician it is possible to be dealing with a problem of severe economic and emotional implications. Possibly involved is the loss of the role of the man within his family. Other suggested problems in this connection might be a marked modification of the self concept of the individual as well as immediate economic problems. For these reasons and others, rehabilitation on the campus especially must be seen as an integrated service designed to individualize the needs and capacities of patients as the patient himself can be brought to accept the services, to define his own goals, and can marshall the necessary level of motivation toward achieving them.

The vocational and economic services are probably the oldest recognized service labeled as a rehabilitation service. They are predicated on the still true assumption that if we are dealing with a handicapped individual, it is axiomatic that no one is more handicapped than the physically disabled person who is without a skill to sell on the labor market and, therefore, must compete against non-disabled individuals in the unskilled labor market. Time will not permit elaboration on this basic point except to say that here again, the university is historically in a unique position to offer services of this type of a rehabilitation nature. At Ohio State University, we are attempting to develop surveys in various activities such as welding, blueprint reading, and the like with a view to getting the "patient's feet wet" and increasing his understandings of what these fields are and what they might actually mean to him in an employment situation. At the same time, these activities provide the staff an excellent practical opportunity to observe aptitudes, work attitudes, the span of interest, the acceptance of supervision, and the like. These are important observations affecting particularly the ability of the individual to accept training and placement in industry.

A university campus as a site for the development of a program to meet these needs must pre-suppose, first, that there is a wide level on the campus of general acceptance and understanding of the nature of rehabilitation. Secondly, it must be presumed that the directorate of the center sees its function on the campus as that of a vehicle to bring these diverse services together and to make them individually available and meaningful to handicapped persons. It should be apparent that an increase in the number of specializations and resources available to a rehabilitation service also brings a corresponding increase in the necessity for efforts towards synthesis and integration of these services. This is true not only administratively in an objective way, but perhaps more important, from the point of view of dynamics of rehabilitation is such integration necessary within the meaning and experience of the client. Otherwise, an increase in the specialization available to the individual too frequently may mean more and more concern for the problems of the patient with increasing loss of the effectiveness of the service, because in fact the patient is unable or unwilling to use them. In this instance, the agency has lost sight of the patient as an individual and is dealing only with his problems, whether or not he may see and accept them as such. At this point, a high level of sustained and individualized counseling becomes a necessity.

A broad rehabilitation program was included in the long-range planning of the new $17,000,000 Ohio State Health Center. In April, 1951, the President of the University appointed a committee broadly representative of the campus to function under the Dean of the College of Medicine, and whose job it was to formulate plans for a rehabilitation center which could combine many of the

resources potentially available on the campus. Through the efforts of many interested groups in the State, the Ohio Legislature in the fall of 1951 approved an amendment to the State Workmen's Compensation Law which stipulated that the State University was to "create and maintain a rehabilitation center" for the physically handicapped. Thus, the Ohio State Rehabilitation Center was established and the first patient was admitted in October, 1952.

Applicants for admission are screened by a committee whose members have wide knowledge and interest in various areas of rehabilitation. The Screening Committee has sole authority to admit, reject or defer applicants to the Rehabilitation Center.

The staff of the Center consists of the Director, the Associate Director (who is also Director of Rehabilitation Services), a Medical Director, an administrative assistant, a family counselor, a psychiatrist, a recreational supervisor (part-time), two graduate students in psychology (as rehabilitation counselors), a resident physician training in the field of Physical Medicine and Rehabilitation, two physical therapists, and one occupational therapist.

On admission, the patient undergoes a brief period of orientation with reference to the organization and function of the Rehabilitation Center even before an exhaustive evaluation of his own problems and rehabilitation potential is undertaken. Each patient has a "counselor" who attempts to establish rapport with him, and otherwise attempts to humanize his experience in the Center from the first. The counselor advises and directs him throughout his stay in the Rehabilitation Center. We have called upon the staff of the University Health Center in the areas of orthopedics, neurosurgery, neurology, psychiatry, urology, plastic surgery, ear-nose-and-throat, eye, internal medicine, dermatology, and dentistry—not to mention the many service areas of the hospital such as laboratories and dietary departments. For emotionally disturbed patients, the Columbus Receiving Hospital for mental patients has made available to us their Day-Care program.

The School of Social Administration was the first in the United States to organize and identify as such a curriculum for training students in the rehabilitation service. It also provides students in the area of social case work and social group work. All these specialties will benefit from the establishment of the Center, since the Center will provide training and field work experience for these students under supervision. We also expect to work with the School through its community organization curriculum to devise means for improving the community planning and financing of services to the handicapped, as well as to improve the general climate of public opinion and understanding regarding the handicapped as a group. The School is actively interested in its group work curriculum in devising means on the group basis for retaining or improving the needed socialization of handicapped individuals, particularly children.

The Occupational Opportunities Service provides assistance through personnel consultation, specialized tests and equipment, and its library of occupational information.

The Psychology Department is actively interested in the development of the Center and has aided in the selection of personnel, and in consultation services. The Psychological Clinic is available and we hope to make great use of it in the future.

The Department of Physical Education provides facilities and personnel for an adapted physical education program for the Center. The scheduled activities include swimming, archery, bait and fly casting, bowling, table tennis, shuffleboard, weight resistance exercises, basketball, and even tumbling. We feel these activities help both from the functional point of view and from the psychosocial point of view. This Department has also played a large part in establishing and directing our recreational program on what we feel is a professional level. We are attempting

not only to utilize patient initiative in recreation in the sense of leading recreation rather than directing it, but we also feel that a patient who can develop competence or even superiority in a recreational performance or game has a probable advantage and greater ease through the use of this activity as a lever in making other social adjustments. Again, the ramifications of this important activity can only be indicated in a paper such as this, but we feel that they are a highly important justification for the location of a rehabilitation center on a university campus.

Speech therapy is provided by the Department of Speech in the College of Education. A member of their staff meets with our aphasic patients two to three times per week.

Off-Campus Services

The location of a rehabilitation center on a university campus also enhances the ability of a rehabilitation center to make more effective use of off-campus resources. In any event, integration of services is necessary with all community and state agencies functioning in the area of rehabilitation. We can only list these at this time, but we feel that the location of this Center on the campus has increased our ability to make better use of the State Bureau of Vocational Rehabilitation and the Ohio State Employment Service. Representatives from both of these organizations sit with our staff and with our Screening Committee in early consideration of patient problems. Our staff is organizing a series of tours in local industrial plants to show patients who of necessity must make a change in occupation and who have little in their own experience as a basis of choice, what men are actually doing in industry and the types of occupations and activities that might be considered under their own circumstances.

Cost of Operation

After the first six months of operation an effort was made to establish a per diem cost. The total expenditures were determined and divided by the average patient load. This gave use a figure of $23 per day per patient. We have been able to stick remarkably close to this figure although the services received by one individual may far exceed those offered another. Examples of this are participation in the physical education program, speech therapy, or industrial arts.

Research

We feel that human rehabilitation is still in its infancy. There is a crying need for more knowledge and experience in the many areas involved. We are experimenting with different methods of screening and admitting patients. We are trying a variety of approaches to the patients in order to bring out the man as well as his problems. Among these are variations in counseling technics, and the use of group discussions. We are using a routine psychiatric evaluation to guide the Center staff and also to eliminate the suspicion and prejudice invariably associated with psychiatric consultation when individual patients are selected for this service. Variations in routine, in recreation, and workshop activities are being tried. We are intensely interested in the use of the rehabilitation team, its composition and organization. As in all centers using the team approach, the problems of integration among the specialties and communication between them are paramount problems. We are experimenting with this problem, but again feel that our setting on the campus puts us at a particular advantage in this respect.

Educational Program

The Ohio State Rehabilitation Center is a service and research center; but perhaps its more important role is that of education. We are all aware of the dire need for trained personnel in all areas of rehabilitation. A center functioning on a university campus offers a unique opportunity to train physicians, counselors, therapists, nurses, recreational workers, psychologists, and others for this service. The need for further education directed toward public attitude

cannot be stressed too much. A rehabilitation center on a university campus is in a strategic position to aid in this problem.

We feel that many universities have similar potential services that could be developed. It is our hope that staff members from other universities will attempt to develop similar or improved programs. In this way, perhaps our combined efforts will contribute significantly to the theory and practice of rehabilitation. It is our view that such activity will not only increase the capabilities of rehabilitation services across the Nation, but will significantly increase the value and effectiveness of the university's contribution to society.

Discussion

Dr. J. L. Rudd (Boston): The paper you have just heard is definitely a new story. It represents a novel pioneering idea requiring much thought and action. Ohio can claim another "first" in its history.

Unusual understanding and cooperation between the legislators and the Industrial Commission of Ohio, on the one hand, and the University of Ohio authorities on the other, was manifest from the very beginning of the project. The University facilities were furnishing everything educational and medical that could be of use in completely restoring handicapped persons to economic usefulness. The legislative body wisely and generously supplied the funds to start and support such a program. I was informed by the speaker that a sum "not exceeding $300,000" was appropriated for the establishment and support of the Ohio State University Rehabilitation Center for the first two years.

The closest approach Massachusetts can get to such a situation is the Massachusetts Rehabilitation Commission. Once in the Department of Industrial Accidents, it was later transferred to the Department of Education so that it could help out in non-industrial seriously injured cases as well as the industrially injured. This Commission concerned itself with the medical aspects of rehabilitation and was not included as a portion of the work that had to be done by the Division of Vocational Rehabilitation or the Industrial Accident Board.

It differs greatly from the Ohio rehabilitation program in that it does not have a State Rehabilitation Center nor does it propose to have one. The function of the Massachusetts Rehabilitation Commission is to approve already existing facilities, check on the more seriously injured cases and refer them, early, to an already existing approved rehabilitation facility.

I would like to have the speaker answer the following questions:

What is the attitude of the physician in Columbus and other cities toward the Center? Do they complain of "State Medicine?" How would you handle cases from other cities that have a rehabilitation center? Isn't the State of Ohio one of the very few, if not the only State that is its own insurance carrier and thus with sufficient excess funds to pay the expenses for such a complete rehabilitation center at the University?

Comparison of Ultrasonic and Microwave Diathermy in the Physical Treatment of Periarthritis of the Shoulder

(STUDY OF THE EFFECTS OF ULTRASONIC AND MICROWAVE DIATHERMY WHEN EMPLOYED IN CONJUNCTION WITH MASSAGE AND EXERCISE)

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As yet, the possible value of ultrasonic diathermy has not been well established[1-3]. In order to conduct an objective and statistical analysis of the therapeutic efficacy of ultrasound it seemed advisable to study its effect in a condition which lends itself to an objective and quantitative evaluation and which occurs with sufficient frequency to permit the collection of an adequate amount of data, including controls, within a reasonable period of time. Furthermore, it seemed advisable to select a condition in which a beneficial effect of ultrasonic energy might be expected in view of the therapeutic effects previously observed and in the light of our knowledge of the biophysical mode of action of ultrasound.

Periarthritis of the shoulder was chosen for the study because, to a large extent, it fulfills these requirements.

Former Clinical Studies

The results attributed to ultrasonic treatment in 177 cases of humeroscapular periarthritis were reported at the International Congress on Ultrasonics which was held in Erlangen in 1949[4]. Of the cases reported, 35.5 per cent were said to show marked improvement; 43.0 per cent were said to be moderately improved. No change was observed in 15.2 per cent, and an exacerbation of the complaints was reported in 1.1 per cent. The therapeutic result could not be evaluated in 5.2 per cent.

In an excellent review of ultrasonic therapy, Friedland and associates[5] reported their findings following the use of ultrasonic diathermy in twenty-one cases of subdeltoid bursitis. Fourteen patients were said to be completely relieved of pain. It was stated that two of these fourteen patients had been treated with other methods without benefit prior to the admission. Two patients were reported as having obtained moderate relief, and three as having clinically insignificant relief. One patient was said to have failed to improve at all. The patients of the control group were treated with other forms of physical therapy. Since the results obtained in these two groups were not evaluated statistically, the authors limited their conclusions to the statement that there was no evidence that ultrasound produces any greater symptomatic effect than conventional physical therapy. Bearzy[6] treated fifty patients having acute and chronic subacromial bursitis with ultrasonic diathermy. A normal range of motion with marked lessening of pain was said to have been obtained in sixty-four per cent of the cases. Ten per cent of the patients were reported as having full range of motion and a moderate improvement of pain following treatment. Four per cent were said to have minimal relief and twenty-two per cent to have no improvement. Bearzy thought that patients having acute bursitis responded better to ultrasound treat-

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ment than did patients having chronic bursitis. Roden[7] treated eight patients who had chronic adhesive subacromial bursitis. He measured the range of scapulohumeral abduction before exposure to ultrasound and four weeks after the treatment. Another group of eight patients was used as a control. These patients did not receive any treatment. Six patients treated with ultrasound were reported to have gained a better range of motion than the patients in the control group. The opinions on the relation of ultrasonic treatment to the other types of physical therapy, such as massage and exercise, vary widely. Some authors emphasize that they used physical therapy such as exercise in addition to ultrasound, whereas other investigators stress the fact that they used ultrasound only.

The impression is obtained from these studies that ultrasound may have a beneficial effect in the treatment of periarthritis of the shoulder. However, it seemed desirable to investigate further the value of ultrasonic diathermy plus massage and exercise in comparison with microwave diathermy plus massage and exercise in the treatment of periarthritis of the shoulders.

Biophysical Effects

The question was raised: What new therapeutic effects, if any, can be expected from the application of ultrasound? It has been pointed out that ultrasound is at the present time the most efficient means of heating certain areas in the depth of the tissues[8,9]. In addition, the distribution of temperature in an organism exposed to ultrasound is a highly specific one. Ultrasound is selectively absorbed at interfaces between tissues of different acoustic impedance[10,11]. The longitudinal ultrasound waves are presumably converted into shear waves at these interfaces. Furthermore, some tissues, such as bone, have a much higher coefficient of absorption than others[12,13]. As a result of this selective absorption the temperature is selectively raised at interfaces, for example, between fibrous connective tissues and muscles[14], and between soft tissues and bone[15-22]. Nerves are also selectively heated[23,25]. It has been demonstrated that the heating effect of ultrasonic energy is chiefly responsible for the biologic effects which are produced[11,24-28]. Nonthermal effects of ultrasound have also been observed[27-33], but their significance for ultrasonic therapy is still poorly understood. In conclusion it can be assumed that ultrasonic energy heats selectively the structures of and around the shoulder joint, such as the fibrous capsule, the muscular tendons, and the bony interfaces, and possibly the nerves of this area.

If it is justifiable to assume that heat applied to the diseased structures of the joint produces beneficial effects[22,34], it might be reasonable to expect from ultrasonic therapy greater heating of certain periarticular structures than from other types of diathermy because ultrasonic energy, although not entirely uniform in its heating effects, raises the temperature selectively in certain structures of the joint.

Methods

The purpose of this study was to determine the value of ultrasonic therapy in comparison with a modern type of diathermy. Seventy-eight patients having periarthritis of the shoulder were treated with ultrasonic energy. The term "periarthritis of the shoulder" is used in this study according to the outline of Coventry[35]. The patients complained of pain and stiffness. On examination there was a limitation of the range of motion and tenderness in most cases. The roentgen examination did not reveal any signs of lesions of the joint. Applications of ultrasound were made once daily for five to ten minutes. The ultrasonic frequencies employed were 1 or 0.8 megacycle per second. The radiating surfaces of the applicators were 5 or 7 sq. cm.* A continuous total output of 2.5 - 14.0 watts was applied with stroking technic[18,36] in such a fashion that the temperature of the periarticular tissues was just below that which will cause periosteal pain[11]. During two-thirds of the

time of treatment ultrasonic energy was applied over the area of the shoulder joint itself, and during one-third of the time it was applied to the muscles of the shoulder girdle including the paravertebral areas. Whether or not this technic produces therapeutic effects by affecting the nerve roots, as has been claimed by others on more or less hypothetical grounds[37], remains questionable.

Another group of seventy-eight patients having periarthritis of the shoulder was treated with microwave diathermy. The efficacy of the ultrasound as a therapeutic agent was compared with that of the microwave therapy because the microwaves are accepted as a modern form of diathermy which is generally considered to be relatively efficient in heating the deeper layers of tissue[38-41]. Microwaves were applied to the shoulders with the "B director" (6-inch hemisphere type of the Microtherm®) for thirty minutes once or twice daily. The selected output of the machine** was 40-100 per cent of the maximal output.

Patients of both groups were told that they were receiving "diathermy." The patients of both groups were treated for the same number of days (average eight days). In other words, for each patient of one group, another patient of the other group was treated for the same number of days. Massage was applied following the ultrasonic and microwave treatment. In addition, identical exercise programs[24] were then given to both groups. These programs included active movements with assistance in forward flexion, abduction and rotation, Codman's exercises and active assistive exercise using an overhead pulley, a shoulder ladder and a shoulder wheel.

The statistical evaluation of the results was based on the measurements of the range of motion before the first and after the last treatment. The forward flexion (scapular and humeroscapular), the abduction (scapular and humeroscapular) and the rotation (humeroscapular) were measured. The gain in range of motion was compared statistically with that observed in the other group. A difference between the results was considered to be significant if it were greater than could be expected by chance with a likelihood of 99.7 per cent (3 sigma equivalent).

For this statistical comparison it was necessary to work with a random distribution of the measured ranges of motion. This requirement was fulfilled, since calculated distribution curves fitted the observed data, satisfactorily at least within the limits of statistical error. Because of this error, owing to the limited number of cases, no attempt was made to find another type of distribution which might fit the observed data even better.

Furthermore, it was imperative to make sure that the type and degree of the disorder in one group were as similar as possible to those of the other. Therefore, distribution curves of the various ranges of motion before treatment, of the duration of the symptoms prior to the admission to the Mayo Clinic and of the age groups were calculated from the observed data. Corresponding curves of both groups of patients were compared with each other. The degree of overlapping of the curves can be considered as an indication of their similarity. It was found that, within the limits of the statistical error, the distribution curves of the group of patients which was treated later with ultrasound were identical with the corresponding curves obtained in the group of patients which was treated later with microwaves (figs. 1, 2, 3, 4 and 5). The ratio of male to female patients was 1:1.5 in the group receiving ultrasonic treatment and 1:1.8 in the group treated with microwaves. In addition, all patients of both groups complained of various degrees of pain. Approximately 15 per cent of each group had stated that they had received roentgen therapy prior to the admission, and approximately 45 per cent had had physical therapy elsewhere.

Results

These data suggest that the types with regard to the duration of the symptoms, to the age distribution and to the ratio

*Manufacturers: Ultrasonic Medical Equipment Corporation, New York, and Burdick Corporation, Milton, Wis.

**Manufacturer: Raytheon Manufacturing Company, Waltham, Mass.

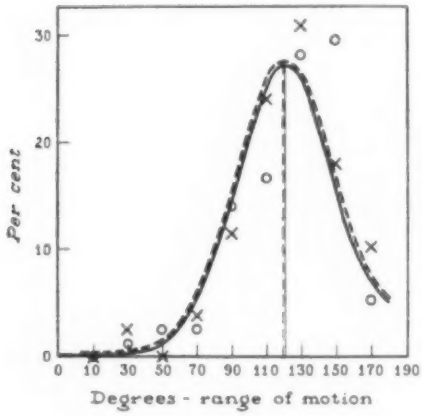

Fig. 1 — Calculated distribution of the range of forward flexion before treatment in the group of patients later on treated with ultrasound ———— and with microwaves — — — —. Data observed in the former (ultrasound) o o o o o and in the latter (microwaves) group x x x x x.

M_{Us}* = 121.9°; σ_{Us}* = ±29.0°; M_{MI}* = 121.1°; σ_{MI}* = ±29.3°.

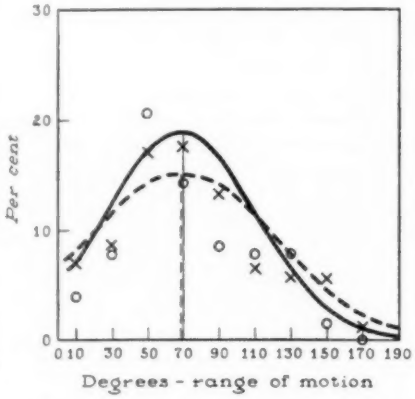

Fig. 3 — Calculated distribution of the range of rotation before treatment in the group of patients later on treated with ultrasound ———— and with microwaves — — — —. Data observed in the former (ultrasound) o o o o o and in the latter (microwaves) group x x x x x.

M_{Us} = 68.7°; σ_{Us} = ±42.3°; M_{MI} = 68.6°; σ_{MI} = ±58.8°.

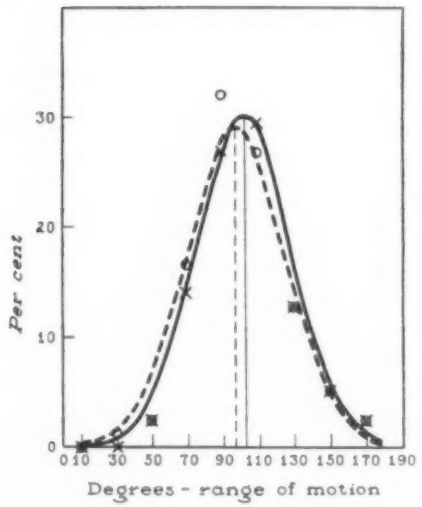

Fig. 2 — Calculated distribution of the range of abduction before treatment in the group of patients later on treated with ultrasound ———— and with microwaves — — — —. Data observed in the former (ultrasound) o o o o o and in the latter (microwaves) group x x x x x.

M_{Us} = 103.4°; σ_{Us} = ±26.5°; M_{MI} = 96.8°; σ_{MI} = ±27.8°.

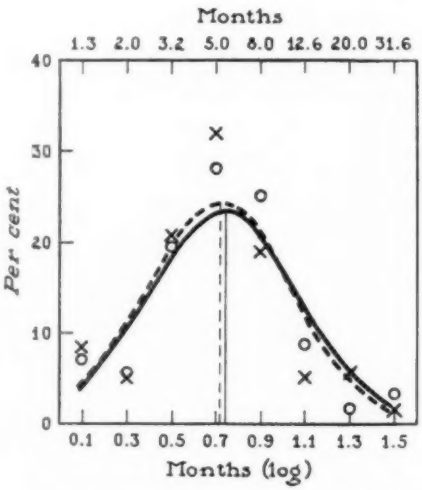

Fig. 4 — Calculated distribution of the duration of symptoms prior to the admission to the clinic in the group of patients treated with ultrasound ———— and with microwaves — — — —. Data observed in the former (ultrasound) o o o o o and in the latter (microwaves) group x x x.

M_{Us} = log (5.4 months); σ_{Us} = ±log (2.19 months); M_{MI} = log (5.2 months); σ_{MI} = ±log (2.22 months).

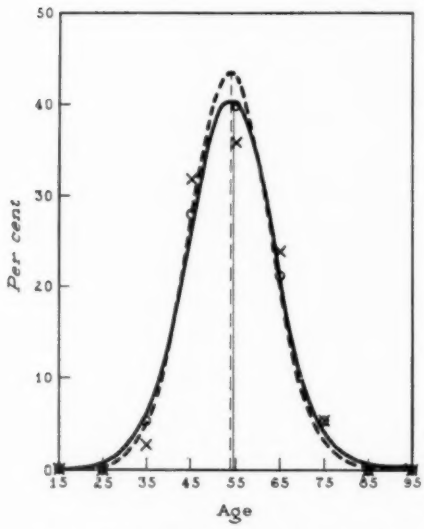

Fig. 5 — Calculated distribution of the age in the group of patients treated with ultrasound ———— and with microwaves — — — —. Data observed in the former (ultrasound) o o o o o and in the latter (microwaves) group x x x x x.
M_{Us} = 54.2 years; σ_{Us} = ±9.9 years; M_{Mi} = 53.9 years; σ_{Mi} = ±9.1 years.

*M_{Us} is the mean of the group treated with ultrasound.

σ_{Us} is the standard deviation of the group treated with ultrasound.

M_{Mi} is the mean of the group treated with microwaves.

σ_{Mi} is the standard deviation of the group treated with microwaves.

of male to female patients and degrees of shoulder involvement were similar enough in both groups before treatment to permit a statistical comparison between the results obtained by ultrasonic therapy plus massage and exercise in one group and by microwave diathermy plus massage and exercise in the other group. The results shown in the table indicate that the gain in the range of motion was somewhat greater when ultrasound was used as the heating agent than when microwaves were employed for producing heat. The difference between the results is statistically significant.

Almost all patients of both groups had variable improvement of the subjective complaints. Only one patient treated with microwaves plus massage and exercise had the same amount of pain following as before treatment. Furthermore, we observed occasionally a slight exacerbation of the pain after the first ultrasonic treatment which in each instance subsided within one or two days after the dose was temporarily reduced.

Comment

These results may perhaps be interpreted as suggesting that ultrasonic diathermy plus massage and exercise is more efficient in treatment of periarthritis of the shoulder than microwave diathermy plus massage and exercise at least with regard to the gain in range of motion. However, this statistical evaluation does not give any information on how much more efficient ultrasound is. Therefore, it still is debatable whether or not ultrasonic therapy should be given preference to the other forms of diathermy. The impression obtained from clinical observation and from the data of table 1 suggests at least that ultrasound can be used by a physician skilled in its application when a suitable machine is available. Ultrasonic diathermy might be tried especially in those cases in which other means have previously been used without a satisfactory result. In this study such patients responded well to ultrasonic treatment plus massage and exercise. The same is true of microwave diathermy plus massage and exercise which might be tried when ultrasonic diathermy has failed. The role of ultrasound in the treatment of periarthritis of the shoulder can be considered as similar to that of any other form of heat treatment. In other words, ultrasonic diathermy plus massage and exercise frequently relieves pain and mobilizes the joint. It is known that hyperemia is produced by ultrasonic diathermy and that the permeability of membranes and cells is increased[25]. These

Table 1: Gain in Range of Motion After Ultrasonic and Microwave Treatment

	After treatment with	
Gain in	Ultrasound	Microwaves
Forward flexion	27.4° ; ±2.3°*	16.1° ; ±1.5°
Abduction	32.6° ; ±2.5°	21.2° ; ±2.1°
Rotation	15.4° ; ±2.8°	17.3° ; ±4.0°

*Standard error of the mean.

effects should be supplemented by an adequate program of massage and exercise. Furthermore, the application of ultrasonic diathermy does not interfere with other types of therapy such as the injection of compound F or procaine and manipulations of the shoulder. On the contrary, the results of such combined therapy may often be beneficial. Perhaps such combinations of treatment should be further investigated.

Finally some shortcomings of ultrasonic diathermy should also be mentioned. Because of the selective heating effect of ultrasonic energy the rise of temperature at interfaces is marked and occurs rather quickly. As a result the margin of safety is not as great as in microwave diathermy. Therefore, it is required that a skilled person apply the ultrasonic treatment preferably with stroking technic. In other words, a continuous attendance is necessary in case of an ultrasonic treatment. This disadvantage may be partially compensated by the fact that the duration of an ultrasonic treatment is usually much shorter than that of a microwave application.

Contraindications

A thorough knowledge of the technic of application is required to apply ultrasonic energy safely and successfully[1]. Furthermore, the contraindications to ultrasonic therapy must be thoroughly understood by the physician prescribing ultrasonic diathermy. Some contraindications to ultrasonic therapy are occasionally encountered in patients having periarthritis of the shoulder[35]. The possible presence of malignant metastatic growths in the axilla should be considered a contraindication. Some tumors grow faster after than before exposure to ultrasonic intensities of the order used for therapy of periarthritis of the shoulder[47,48].

Furthermore, Stuhlfauth[44] observed that the coronary circulation was decreased in dogs if excessively high doses of ultrasound were applied to the thigh. Stuhlfauth[44], Fuchs and Buchtala[45], Ungeheuer[46] and Pezold[47] also observed attacks of angina, which occurred in patients having coronary sclerosis or other forms of "heart disease," after therapeutic application of ultrasonic energy to the stellate ganglion or to other parts of the body. However, it could not be determined whether the angina occurred because of or incidentally after ultrasonic therapy. Koeppen[48] irradiated 140 patients having "heart disease" without untoward effects. Thus, it seems to be advisable to consider certain diseases of the heart as a contraindication until proved otherwise.

Finally, ultrasonic energy should be applied to the shoulder joint alone and not to the muscles covering the chest wall in patients having inflammatory infiltrations of the lungs. Exacerbations of such pulmonary inflammations have been observed[47] following such applications.

Conclusions

Biophysical research suggests that ultrasonic energy raises selectively the temperature of certain periarticular structures of the shoulder. The clinical results of this study may perhaps be interpreted as being in favor of ultrasonic diathermy if its efficacy is compared with that of the accepted microwave diathermy as a means of heating the periarticular structures of the shoulder. However, this statistical study does not give any information on how much more effective ultrasonic energy is than microwave diathermy. Therefore, it still is debatable whether or not ultrasonic therapy should be given preference to other forms of deep heating. At any rate, when applied by a physician who is skilled in its use, ultrasonic diathermy seems to be a suitable method of heating periarticular structures in conjunction with other methods of treatment for periarthritis of the shoulder.

References

1. Lehmann, J. F.: The Present Status of Ultrasonic Therapy. Arch. Phys. Med. & Rehab. 34:741 (Dec.) 1953.
2. Krusen, F. H.: Present Status of the Use of Ultrasonic Energy in Physical Medicine. South. M. J. 45:55 (Jan.) 1952.

3. Council on Physical Medicine and Rehabilitation: Present Status of Use of Ultrasonic Energy in Physical Medicine. J.A.M.A. **148**:646 (Feb. 23) 1952.
4. Statistik über mit Ultraschall erzielte Heilerfolge: (Ergebnis einer Umfrage). Der Ultraschall in der Medizin **1**:389, 1949.
5. Friedland, Fritz; Bisgrove, J. G., and Doyle, B. J.: Therapeutic Application of Ultrasonic Energy. Arch. Phys. Med. **33**:461 (Aug.) 1952.
6. Bearzy, H. J.: Clinical Applications of Ultrasonic Energy in Treatment of Acute and Chronic Subacromial Bursitis. Arch. Phys. Med. & Rehab. **34**:228 (Apr.) 1953.
7. Roden, Dermot: Ultrasonic Waves in the Treatment of Chronic Adhesive Subacromial Bursitis. J. Irish M. A. **30**:85 (Apr.) 1952.
8. Schwan, H. P., and Carstensen, E. L.: Advantages and Limitations of Ultrasonics in Medicine. J.A.M.A. **149**:121 (May 10) 1952.
9. Schwan, H. P.; Carstensen, E. L., and Li, K.: Heating of Fat-muscle Layers by Electromagnetic and Ultrasonic Diathermy. Tr. Am. Inst. Electrical Eng. **72**:483 (Sept.) 1953.
10. Hüter, T. F., and Rosenberg, M.D.: Bericht über die medizinisch-biologische Ultraschall-Arbeitstagung in Urbana, Illinois, U. S. A. (25.-29. Mai, 1952). Der Ultraschall in der Medizin **5**:140 (Sept.) 1952.
11. Hueter, T. F.: On the Mechanism of Biological Effects Produced by Ultrasound. Chemical Engineering Progress Symposium Series vol. 47, **1**:57, 1951.
12. Hüter, T. F.: Messung der Ultraschallabsorption im menschlichen Schädelknochen und ihre Abhängigkeit von der Frequenz. Die Naturwissenschaften **39**:21, 1952.
13. Hueter, T. F., and Bolt, R. H.: An Ultrasonic Method for Outlining the Cerebral Ventricles. J. Acoustical Soc. America. **23**:160 (Mar.) 1951.
14. Patzold, J., and Born, H.: Behandlung biologischer Gewebe mit gebündeltem Ultraschall. Strahlentherapie **76**:486, 1947.
15. Lehmann, Justus, and Nitsch, Willi: Über die Frequenzabhangigkeit biologischer Ultraschall-reaktionen mit besonderer Berücksichtigung der spezifischen Temperaturverteilung im Organismus. Strahlentherapie **85**:606, 1951.
16. Lehmann, Justus, and Feissel, Hans-Joachim: Inwieweit lässt sich die Ultraschall-leistung durch Zufuhr von Wärmeenergie in ihrer biologischen Wirkung ersetzen. Strahlentherapie **85**:615, 1951.
17. Herrick, J. F.; DeForest, R. E.; Janes, J. M., and Krusen, F. H.: Effects of Ultrasonic Energy on Growing Bone (Abstr.). Fed. Proc. **10**:62 (Mar.) 1951.
18. Bender, L. F.; Herrick, J. F., and Krusen, F. H.: Temperatures Produced in Bone by Various Methods Used in Ultrasonic Therapy: An Experimental Study. Arch. Phys. Med. & Rehab. **34**:424 (July) 1953.
19. Horvath, Joseph: Experimentelle Untersuchung über die Verteilung der Ultraschallenergie im menschlichen Gewebe. Ärztliche Forsch. **1**:357, 1947.
20. Nelson, P. A.; Herrick, J. F., and Krusen, F. H.: Temperatures Produced in Bone Marrow, Bone and Adjacent Tissues by Ultrasonic Diathermy: An Experimental Study. Arch. Phys. Med. **31**:687 (Nov.) 1950.
21. Theismann, Hans, and Pfander, Friedrich: Über die Durchlässigkeit des Knochens für Ultraschall. Strahlentherapie **80**:607, 1949.
22. Herrick, J. F.: Temperatures Produced in Tissues by Ultrasound: Experimental Study Using Various Technics. J. Acoustical Soc. America. **25**:12 (Jan.) 1953.
23. Rosenberger, H.: Über den Wirkungsmechanismus der Ultraschallbehandlung, insbesondere bei Ischias und Neuralgien. Chirurg. **21**:404, 1950.
24. Lehmann, J. F.: The Biophysical Mode of Action of Biologic and Therapeutic Ultrasonic Reactions. J. Acoustical Soc. America. **25**:17 (Jan.) 1953.
25. Lehmann, J. F.: The Biophysical Basis of Biologic Ultrasonic Reactions With Special Reference to Ultrasonic Therapy. Arch. Phys. Med. & Rehab. **34**:139 (Mar.) 1953.
26. Lambert, E. H.; Treanor, W. J., and Herrick, J. F.: Effect of Heat and Ultrasound on Conduction in Bullfrog Nerve (Abstr.). Fed. Proc. **10**:78 (Mar.) 1951.
27. Lehmann, Justus; Becker, Georg, and Jaenicke, Walther: Über die Wirkung von Ultraschall-wellen auf den Ionendurchtritt durch biologische Membranen als Beitrag zur Theorie des therapeutischen Wirkungsmechanismus. Strahlentherapie **83**:311, 1950.
28. Lehmann, J. F., and Biegler, Rolf: Changes of Potentials and Temperature Gradients in Membranes Caused by Ultrasound. Arch. Phys. Med. & Rehab. **35**:287 (May) 1954.
29. Lehmann, Justus; Becker, Georg, and Otto, Joachim: Thermische und mechanische Wirkungen des Ultraschalles auf einzelne Zellen untersucht am Beispiel der eosinophilen Leukozyten. Strahlentherapie **87**:550, 1952.
30. Lehmann, J. F., and Herrick, J. F.: Biologic Reactions to Cavitation, a Consideration for Ultrasonic Therapy. Arch. Phys. Med. & Rehab. **34**:86 (Feb.) 1953.

31. Lehmann, J. F.; Herrick, J. F., and Krusen, F. H.: The Effects of Ultrasound on Chromosomes, Nuclei and Other Structures of the Cells in Plant Tissues. Arch. Phys. Med. & Rehab. 35:141 (Mar.) 1954.
32. Fry, W. J.: Action of Ultrasound on Nerve Tissue—A Review. J. Acoustical Soc. America 25:1 (Jan.) 1953.
33. Gersten, J. W.: Ultrasonic Effects on Muscle. Rheumatism 9:58 (July) 1953.
34. Krusen, F. H.: Physical Medicine: The Employment of Physical Agents for Diagnosis and Therapy. Philadelphia, W. B. Saunders Company, 1941.
35. Coventry, M. B.: Problem of Painful Shoulder. J.A.M.A. 151:177 (Jan. 17) 1953.
36. Lehmann, Justus: Die Beziehungen zwischen therapeutischer Dosis und biophysikalischer Wirkung der Ultraschallwellen. Der Ultraschall in der Medizin 3:24, 1951.
37. Tschannen, Fritz: Effects of Ultrasonic Therapy on Rheumatic Diseases and Circulatory Disorders. Brit. J. Phys. Med. 15:7 (Jan.) 1952.
38. Wakim, K. G.; Herrick, J. F.; Martin, G. M., and Krusen, F. H.: Therapeutic Possibilities of Microwaves: Experimental and Clinical Investigation. J.A.M.A. 139:989 (Apr. 9) 1949.
39. Rae, J. W., Jr.; Herrick, J. F.; Wakim, K. G., and Krusen, F. H.: A Comparative Study of the Temperatures Produced by Microwave and Short Wave Diathermy. Arch. Phys. Med. 30:199 (Apr.) 1949.
40. Herrick, J. F.; Martin, G. M.; Krusen, F. H., and Wakim, K. G.: Physical Medicine: Diathermy, Microwave. In Glasser, Otto: Medical Physics, Chicago, The Year Book Publishers, Inc., 1950, vol. 2, pp. 710-712.
41. Herrick, J. F., and Krusen, F. H.: Certain Physiologic and Pathologic Effects of Microwaves. Electrical Engineering pp. 1-6 (Mar.) 1953.
42. Horatz, K.: Erfahrungen bei der Tumorbeschallung. Der Ultraschall in der Medizin 1:249, 1949.
43. Bode, H.-G. and Theismann, H.: Zur Frage des biologischen Wirkung des Ultraschalls, zugleich ein Beitrag über klinische Erfahrungen einschliesslich der Tumorbehandlung. Der Ultraschall in der Medizin 1:291, 1949.
44. Stuhlfauth, K.: Neural Effects of Ultrasonic Waves. Brit. J. Phys. Med. 15:10 (Jan.) 1952.
45. Fuchs, H. K., and Buchtala, V.: Ergebnisse der Ultraschallbehandlung und experimenteller Untersuchungen. Deutsche med. Wchnschr. 1:277 (Mar.) 1949.
46. Ungeheuer, E.: Ergebnisse der Ultraschalltherapie in der Chirurgie. Arch. Phys. Therap. 3:86, 1951.
47. Pezold, F. A.: Zur Frage des Ultraschallschadens. Der Ultraschall in der Medizin 4:1, 1952.
48. Koeppen, Siegfried: Nebenerscheinungen bei Ultraschallbehandlung. Deutsche med. Wchnschr. 1:403 (Mar.) 1952.

Physiological Background for Neuromuscular Reeducation and Coordination

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Neuromuscular reeducation may be taken to mean the reestablishment of useful voluntary movement patterns. The physiologic basis for this reeducation is the integrated content of the physiology of muscle and nerve. The pertinent items of muscle physiology have been reviewed by Wakim[1]. Ralston[2] has discussed the mechanics of voluntary muscle. Recent findings concerning muscle detector feed back mechanisms have been covered by Hodes[3]. The role of facilitation and inhibition in central excitation has been described by Levine and Kabat[4]. From this vast array of information there stems a few broad principles which can form the foundation of a rational retraining program. These include:

1. Voluntary movement patterns are conditioned responses.
2. For "normal" movement there must be a "normal" trinity of detector—integrator—effector.
3. The need for retraining implies failure in one or more of the systems involved in "normal" movement.
4. The retrained movement pattern will have to depart from "normal" in proportion to the irreversibility of the failure.
5. Failure points must be located and treated specifically, so that if reversible the training can be made on an essentially normal system or if irreversible the training will be made with appropriate substitutions in the system.
6. The preliminary work of treating specific failure points must precede retraining proper because the movement pattern to be trained is predicated upon the result of the treatment of failure points.
7. A unitarian approach to retraining in the sense of directing attention exclusively to detectors, integrators, or effectors will be self limiting in proportion to its exclusiveness.

Physiologically, conditioning can be considered as establishing a spectrum of neuron thresholds which will yield a reliable temporal pattern of recruitment and inhibition for effector excitation. This is most easily done on the basis of existing patterns, the exploitation of which has been described by Kabat[5]. Sometimes the existing pattern cannot be used because it is bizarre or because of a deficit in the detector or effector systems requiring some sort of substitution and a new excitation pattern. For this it will be necessary to produce decay in certain of the existing patterns. This involves specific and detailed attention to the movement, the parts involved, and often to specific muscles.

An instance of spontaneous, undesirable excitation patterns can be found in weak muscles for which training has been neglected. A muscle too weak to participate in movement patterns in which it would normally be involved comes to be ignored in the excitation pattern for that movement. This can result in a strange excitation pattern of the motor neurons to that muscle in that they may be stimulated to threshold by irrelevant motor activity but cannot be activated voluntarily. The muscle is found responding in motor activities in which it should have no concern but is absent from formations in which it should participate. Figure 1 illustrates the action potential from such a muscle, a biceps, weakened by poliomyelitis, and untreated for fifteen years. Now it responds along with the diaphragm to each inspiratory barrage, not only with electrical activity but also with a small but visible contraction. Yet this muscle is not under volitional command. Obviously here the first step in retraining is meticulous attention to the excitation and inhibition of the motor neurons of the muscle in question.

Another instance where retraining requires extensive reorganization of the excitation pattern is found in muscle transplants of the type where a fraction of the sublimis is rearranged anatomically to serve as a finger extensor. The best results are obtained from such a transplant when the individual learns to use that portion of the sublimis as a finger extensor rather than have it contract in the old flexor pattern. The excitation pattern to this neuron pool

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must now be in a quite different phase than it was before transplant. Reeducation involves careful attention to the muscle transplant, substitution of visual appraisal for muscle detectors and practice against little resistance until the transplanted portion is dissociated excitation wise from the rest of the sublimis and is associated in movement with finger extensors. Figure 2 illustrates the electromyogram from such transplants during voluntary finger flexion and extension in an untrained and in a retrained individual. Obviously such retraining cannot be made upon the "normal" reflex pattern of the transplant. First one must produce decay of the normal response and then proceed to reconditioning in the abnormal but desired pattern.

It is well known that any movement pattern involves a number of different muscles in a temporal varying pattern of simultaneous and sequential activity[8]. This demands at least a certain minimal strength of each muscle involved in the movement. Where retraining is required, the strength available in some or all of the muscles involved is usually a part of the retraining problem.

Deficient muscle strength is based on one of two or a combination of two defects; first, an inability to activate enough of the motor units present and secondly, an inadequate strength of the motor units available for contraction.

An apparent muscle weakness can result from improper timing in excitation to the muscle. The situation where the excitation is completely out of phase has already been discussed. Where the timing is only partially out of phase, as it is in all unpracticed movement, simple continued practice in specific movement will develop the maximum conditioning possible for that particular nervous system.

In most individuals there is a considerable number of anterior horn cells that cannot be brought into action by voluntary effort, but if they are adequately facilitated they are found to command motor units of significant strength. Conditioning technics will tap this reserve to some extent. That these high threshold neurons are not easily conditioned is shown by the rarity with which individuals are able to gain voluntary control over this fraction of the neuromuscular apparatus. That this reserve does exist is shown in many instances where unusual strength is exhibited in highly emotional situations where facilitation reaches a very high level and inhibition is at the same time removed. A similar type of release of inhibition or augmentation of facilitation can be obtained with strychnine. It is not certain that attempts at training during drug facilitation will be retained after the abnormal situation has abated. Such generalized and essentially uncontrolled facilitation has the disadvantage of no specificity whereas in trained movement what is required is a specific pattern of facilitation and inhibition. However, the use of facilitative drugs might be very helpful as a method of assay for high threshold motor neurons, with such assay being used as a guide to continued attempts to bring those neurons under voluntary control by conventional conditioning technics.

One of the most difficult problems in neuromuscular retraining is the one presented by weak muscles—weak because of too little muscle or too little strength per unit volume. Here specific attention has to be given to the particular muscle in question. The muscle must be brought to a strength sufficient for participation in the movement pattern. Movement training technics cannot be applied before the muscle can participate or else a pattern will be developed that excludes the weak muscle from the movement.

The amount of strength increase obtainable in a muscle after irreversible injury is limited to the strength increment available from hypertrophy plus that latent in the high threshold motor neuron pool. Muscle hypertrophy can only be obtained by heavy resistance exercise. This means graded and near maximum load in repetitive effort. Of course, heavy load must be defined in terms of the muscle under treatment.

For a given muscle, badly damaged, it might be below the weight of the anatomic part, which would mean that so-called assistive exercise would really be heavy resistance for that muscle. In the instance of spotty muscle weakness it is important that no hypertrophy-producing exercise be given to the muscles that are already too strong with relation to the weak muscle. The object is correct muscle balance. Non-directed strength therapy will not lead to the balanced strength required for coordinated movement. The strength increment to be obtained from muscle hypertrophy per se is probably rather small. It is highly probable that such exercise also helps to bring some of the high threshold neurons within the orbit of voluntary activity. Such exercise is indicated in trying to bring the strength of a muscle to a useful range. If it fails the final resort is substitution, which necessarily means an abnormal movement pattern which may or may not involve mechanical aids. In any event, when the muscle situation is defined and a movement pattern is to be taught the type of training required is skill training. This implies relatively light loads and much repetition in the movement. All the rules of conditioning must be observed. The trainee must have adequate motivation for learning. Training staleness must be avoided. Skill is not enhanced by continued practice while fatigued. In fact, practice in the fatigued state may produce decay in a carefully chosen and well balanced movement pattern.

In such retraining certain movement patterns existent in the trainee may be used to hasten learning by linkage to the already established pattern. In other instances, existent patterns of excitation

Fig. 1 — Electromyogram of poliomyelitis damaged biceps untreated for fifteen years; involuntary rhythm with inspiration.

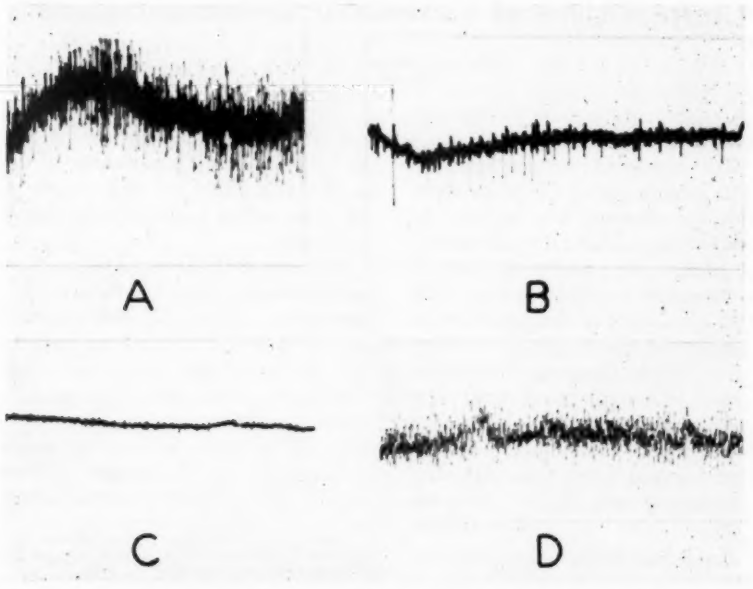

Fig. 2 — Electromyograms of transplated sublimis. Finger flexion (A) and finger extension (B) in untrained transplant; (C) finger flexion and (D) extension in trained transplant.

may be so contrary to the pattern to be taught that decay of the existent pattern must precede training in movement.

General principles concerning neuromuscular reeducation cannot define the specific regimen for a given retraining problem. Rather, such principles represent the framework within which the versatile trainer can operate to prescribe a specific program for a specific problem. It should be apparent that retraining programs must be mapped with regard to the qualitative and quantitative aspects of the deficiency that makes retraining necessary. This means that there will be as many training programs as there are trainees if the training is to be maximal for each one.

Summary

Voluntary movements are conditioned responses of a detector-integrator-effector system. In retraining, new patterns of coordination of these systems may have to be established because of failure at one or more points in the original system. This demands specific and meticulous attention to the parts involved, whether originals or substitutes, in order to establish a spectrum of neuron thresholds that will yield a reliable temporal pattern of recruitment and inhibition to the effector apparatus.

References

1. Wakim, K. G.: The Physiologic Aspects of Therapeutic Physical Exercise. J.A.M.A. **142**:100, 1950.
2. Ralston, H. J.: Mechanics of Voluntary Muscle (Special Review). Am. J. Phys. Med. **32**:166, 1953.
3. Hodes, Robert: The Innervation of Skeletal Muscle. Ann. Rev. Physiol. **15**:139, 1953.
4. Levine, Milton G., and Kabat, Herman: Dynamics of Normal Voluntary Motion in Man. Permanente Foundation M. Bull. **10**:212, 1952.
5. Kabat, Herman: Central Facilitation: The Basis of Treatment for Paralysis. Permanente Foundation M. Bull. **10**:190, 1952.
6. Inman, V. T.; Saunders, J. B., and Abbott, L. C.: Observations on the Function of the Shoulder Joint. J. Bone & Joint Surg. **26**:1, 1944.

Clinical Uses of Chronaxie Determinations

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Individuals active in physical medicine have employed various types of electrical muscle testing for many years. Recently, this interest has centered on information provided by the electromyogram. Ideally, all possible methods of testing should be available, together with adequate knowledge of their application. The purpose of this paper is to review the value which chronaxie determinations have in the diagnosis and prognosis of lower motor neuron disease. A primary consideration is that chronaxie equipment is much less expensive than the electromyograph, and the information obtained from it is equally valuable.

Chronaxie was defined by Lapicque[1] in 1909. It is the shortest duration of an electrical current necessary to produce excitation in tissue, when the current strength is twice the rheobase. As the word implies, it is a measure of time. In this discussion, we will confine the use to excitation of muscles through the intact skin.

When the surface electrical concentration of muscle fibers is sufficiently high, contraction occurs. If the current is applied for an infinitely long period of time, the strength of the current may be reduced to a minimum level which still produces contraction of the muscle fibers. This current strength was defined by Lapicque[1], as the rheobase. It makes no difference whether voltage or amper-

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age is used, since they are proportional to each other. Some confusion exists in the literature regarding this term.

As the pulse width is progressively decreased, it is necessary to increase the strength of the current to produce minimum contraction of the muscles. These points plotted on a curve give a typical strength duration pattern. It is possible to plot an entire strength duration curve for each muscle. However, it is far more practical to utilize the rheobase and one arbitrary point on the strength duration curve to ascertain the shape of the entire curve. By definition of an hyperbola, this is possible. Lapicque[2] showed the strength-duration curves to be approximately an hyperbola. The arbitrary point on the curve is the chronaxie value. It is at that point where the current is exactly double the rheobase value. In 1923 Bourguignon[3] applied the use of chronaxie to clinical investigations.

There has been much criticism concerning the use of chronaxie values. This is due partially to the difficulty in reproducing results. If standard technic is followed rigorously, and duration of current produced in the machine checked against a standard time, it is possible to achieve reproducible results. If all the experimental errors are pyramided in one incorrect determination, it is possible to err from the correct value by as much as 675 per cent[4]. Actually results are reproducible with less than a ten per cent error. Arbitrarily, a level of ten times the expected normal is set as the point where a value is called abnormal. Ordinarily, the chronaxie values for muscles are about 0.1 millisecond. Anything over 1.0 millisecond is considered a significant variation from normal. The use of chronaxie determinations is a refined method of performing reaction of degeneration test. Where that is of value, chronaxie is more useful. Lewy[5] has written extensively about the use of chronaxie in detecting overexcitable and underexcitable muscles when the nerve supply has been damaged by lead or other industrial toxins. In 1942 Moldaver[6] demonstrated the practical usefulness of this determination in the diagnosis of certain neuromuscular disorders. Nulsen and Grant[7] in 1952 showed that muscle chronaxie changes, of a focal nature, permit positive diagnosis of the presence of intraspinal mass lesions, ruptured intervertebral discs, and extramedullary pressure in the plexuses.

There is significant elevation of the muscle chronaxie values when its lower motor neuron is damaged at any point between the anterior horn cells and the neuromuscular junction. If insufficient time has elapsed since disease or injury, for wallerian degeneration to occur, the chronaxie value may be normal. If sufficient time elapses to permit muscle fibers innervated by damaged nerves to atrophy completely, the remaining fibers in the muscle will have a normal chronaxie value. There is never a false positive elevation of chronaxie. An elevation is always significant. Damage of the central nervous system above the lower motor neuron produces no elevation of chronaxie; nor does direct muscle damage, as indicated in progressive muscular dystrophy. Obviously, to acquire information concerning the central nervous system or the muscle fibers themselves, other tests must be utilized. If the time intervals are properly selected and consideration given to the clinical picture, a negative chronaxie, i.e. one in which the values are normal, may be relied upon more than seventy-five per cent of the time.

A suggested technic, which is found to produce reliable, and reproducible results is as follows. The indifferent electrode attached to the anode of the generator is placed constantly on the contralateral limb. The moistened exploring electrode, preferably warm, is attached to the cathode of the generator. A current is employed of sufficiently wide pulse to fall on that part of the strength duration curve asymptomatic to the x-axis. A current intensity sufficient to produce visible contraction of the muscle is selected. Wherever possible this is strong enough to produce the clinical response which the muscle ordinarily performs, as evidenced by moving

the joint distal to the muscle or producing contraction of the tendon of the muscle. The motor point is located by moving the exploring electrode over the muscle belly until the point of maximum response is visualized in the muscle. Then the intensity of the current is decreased progressively until minimal contraction of the muscle is seen. The end point is subjective, but accurate reproduction of the observation is quickly learned. This minimum current, producing a visible contraction, is the rheobase. Following the already stated definition of chronaxie, the current is doubled and starting from zero is applied periodically to the same motor point at progressively increasing pulse durations. When the contraction in the muscle is again equal to the minimal contraction of the rheobase, the time is recorded. This is the chronaxie for that muscle. Each belly of a muscle will have its own value, which should be determined independently. If an elevated value is observed the rheobase should be rechecked. It is well to calibrate the time intervals on available pulse wave generators, since many are marketed with large errors[4].

Chronaxie changes are specific for lower motor neuron disease. Elevated values may be expected in any anterior horn cell disease such as poliomyelitis, spinal atrophy, amyotrophic lateral sclerosis, or Landry's paralysis. Diseases of the central nervous system which affect the lower motor neuron incidentally only or late, such as multiple sclerosis and syringomyelia, produce disseminated chronaxie changes. If the investigator records from all available muscles, it is an easy matter to see that the distribution of denervation is much too wide to incriminate a root, plexus, or peripheral nerve.

Nulsen and Grant[7] used this method to localize spinal cord tumors and ruptured discs. In their series, twenty-two of twenty-four discs were correctly localized. Eleven of twelve cord tumors, including three with normal myelograms were diagnosed. In lumbar discs, it was found that extensor digitorum longus denervation always indicates root compression at L-4-5. Gastrocnemius involvement indicates pressure at L-5 to S-1. If both are elevated there may be a large disc at L-4-5 or a disc at both. Additional cases corroborate these findings. Cervical discs are much easier to localize because of the extensive overlap of innervation. If there is root pressure, all of the muscles having even partial innervation from that root may show involvement in the chronaxie values; usually enough to make possible focal localization.

In this investigation 246 cases were studied. They may be divided as follows:

Neurological Condition	Cases	Chronaxie Values
Upper motor neuron disease	22	Normal
Diseases in cord involving LMN	33	Elevated
Root pressure	12	"
Peripheral nerve lesions including plexuses	57	"
Peripheral neuropathies	26	"
Diabetes	8	"
Periarteritis nodosa	2	"
Guillain-Barré	1	"
Tumors	5	"
Lead Toxicity	3	"
Alcoholic	1	"
Neuromuscular disease	29	Normal
Myasthenia gravis	17	"
Muscular dystrophy	12	"
No objective neurological findings	37	"

True neuridities such as Guillain-Barré syndrome, diabetic neuropathy, and lead toxicity, elevate the chronaxie values. Neurofibroma and periarteritis nodosa produce either focal or widespread changes.

In a peripheral nerve lesion chronaxie is of value in detecting slight changes where the nerve is involved only partially. If one waits for chronaxie changes only, there may be good return of function long before the chronaxie is normal. Valuable time will be lost to the patient if the electromyograph is not employed as well.

At the neuromuscular junction or in the muscle fibers themselves, pathological changes can occur, producing muscular weakness without any elevation in chronaxie. An elevation is always significant. If chronaxie changes are sought carefully and none is found, then a diagnosis of muscular dystrophy may be confirmed. Eight early cases were included in this study. Myasthenia gravis and periodic paralysis also have normal chronaxie values.

Electromyography has achieved such great popularity that its omission in any discussion of electrical testing makes the discussion incomplete. In over 200 cases tested, fibrillation or pathological fasciculation voltages have never been observed in muscles having normal chronaxie values. Therefore, this is a good method of locating appropriate areas where you may find electromyographic evidence of denervation.

Electromyography is useful in determining approximate percentage of involvement, early prognosis of recovery, and early denervation before wallerian degeneration has occurred. These testing devices should be complementary, supplementary, and corroborative. In complete peripheral nerve lesions electromyography is more helpful than chronaxie. However, the combination gives additional information.

An area of further usefulness lies in establishing diagnosis of hysteria, malingering, or in ruling out these possibilities. Occasionally a patient consciously or unconsciously learns to mimic the signs and symptoms of a patient with peripheral nerve involvement or lower motor neuron disease and this method demonstrates the electrical and anatomical inconsistencies of the picture.

If the investigator uses consistent technic he may obtain repeatable observations of denervation from elevated chronaxie values of muscle. Following the possible location of damage proximally from the muscle to the anterior horn cell there will be a point in the peripheral nerve, the plexus, the root, or the cord itself where the nerve pathways to the involved muscles must cross and a focal point where the damage occurred. Failure to find such a focal point indicates clear cut evidence of a diffuse process.

The great advantage of this method of diagnosis is its relative painlessness to the patient and ease of accomplishment for the investigator. It is a simple method of obtaining very valuable information. It should be used in conjunction with a careful neurological examination, electromyography, skin resistance determinations, twitch tetanus ratios, and strength duration curves, where applicable. Chronaxie values are very useful in this battery of tests and should be employed. Three typical cases illustrate the value of this procedure.

1. G.M., white, male, age 27: This patient received an unusual compensable injury of his right hand five weeks prior to testing. He had total recall of the details of the accident. He immediately developed sudden and persistent loss of sensation and function of the median nerve. However, skin resistance was normal in the thumb and index finger. Stimulation of the nerve produced a good response in the median muscles of the thenar eminence. Electromyographic recording from the opponents showed no evidence of denervation and all chronaxie values were normal. The final diagnosis was hysteria.

2. J. W., white, female, age 35: Six weeks prior to testing, the patient became dizzy and fell at a picnic. She was diagnosed as labyrinthitis. Three weeks later pain developed over the lateral aspect of the left arm. Examination revealed no objective changes in sensation or motor power. Chronaxie determinations of a few typical muscles were as follows:

	Left	Right
Flexor Pollicis Brevis	6.0	0.3
Opponens Pollicis	1.0	0.2
Extensor Digitorum Communis	0.8	0.3
Anconeus	1.0	0.1

On the basis of this a diagnosis of C-7 pressure was made. In spite of negative myelography, surgical exploration revealed a cervical disc producing root pressure.

3. E. S., white, male, age 13: Eleven days prior to testing, this boy fell on broken glass and sustained a laceration behind the head of the fibula. Two days later he had a foot-drop. On examination he could feel 1/8 gm. touch, but had spotty pain loss for 10 gm. in a small zone over the dorsum of the foot between the first and second toes. Chronaxie values were as follows for the muscles innervated by the common peroneal nerve.

	Right	Left
Anterior Tibial	13.0	0.3
Extensor Hallucis	22.0	0.2
Extensor Digitorum Longus	24.0	0.2
Peroneus Longus	0.3	0.3

Electromyographic recording from the anterior tibial muscle failed to show any evidence of denervation, other than the fact that no motor unit potentials were seen either on voluntary effort or on stimulation of the peroneal nerve. One month later the abnormal chronaxie values were elevated two to three times and the electromyographic pattern had not changed, but the sensory loss had disappeared. Operation showed a neuroma in continuity of the deep peroneal nerve confirming the impression derived from the initial test.

These cases are included not because they are at all unusual, but because they illustrate the possible uses of chronaxie testing and its relationship to the more commonly employed electromyogram.

References

1. Lapicque, L.: Definition experimentale de l'excitabilite. Compt. rend. Soc. de biol. 67:280, 1909.
2. Lapicque, L.: L'excitabilite en fonction du temps. Paris, Les Presses Universaires de France, 1926.
3. Bourguignon, G.: "La Chronaxie Chez l'homme," Paris, Messon et Cie., 1923.

4. Erdman, W. J.: Effects of Variations in Techniques on Clinical Chronaxie Determinations. Am. J. Phys. Med. 33:3-167 (June) 1954.
5. Lewy, F. H.: Strength Duration Curves of the Overexcitable and Underexcitable Nerve Muscle Apparatus and Some Consequences Bearing on the Clinical Application of Chronaximetry. Am. J. M. Sc. 191:491, 1936.
6. Moldaver, J.: Clinical Chronaxie. Dis. Nerv. System 3:20 (Jan.) 1942.
7. Nulsen, F. E., and Grant, F. C.: Chronaxie as an Aid in Localization of Intraspinal Nerve Lesions. Tr. Am. Neurol. A. 77:158, 1952.

Discussion

Dr. Edward M. Krusen, Jr. (Dallas, Texas): For the last few days we have had the privilege of listening to a great many excellent papers on electromyographic studies. I think Dr. Erdman should be thanked for re-emphasizing to the clinician the value of the simpler methods of electrodiagnosis, such as his chronaxie determination.

Dr. Erdman has given an excellent and accurate description of his technic. He has obtained an error of only ten per cent for this method, but I fear that most clinicians do not obtain such accuracy.

I was interested to hear that Dr. Erdman considers chronaxie alone an adequate diagnostic test. I feel that the complete strength-duration curve and tetanus-twitch ratio determinations give more complete information than chronaxie alone for very little extra effort.

As the author states, chronaxie has its main value in determining lesions of the lower motor neurons. He mentions the fact that there are no false positives. I would like to ask if follow-up studies showed any false negatives and what types of cases were the greatest problem in this respect. I find the greatest difficulty not in complete lesions, but in the spotty type of lesions, such as amyotrophic lateral sclerosis or compression injuries to nerves. I think statistics along this line would greatly enhance the value of this paper to the clinician.

I again want to thank Dr. Erdman for this review of a method to screen out conditions where further study by electromyography or other procedures is indicated. This type of paper is of tremendous value to those of us who find the press of clinical work too great to spend much time on the more elaborate testing methods.

The Chronic Rheumatoid Arthritic: Psychosocial Factors in Rehabilitation

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Saul Miller, M.D.
Reva King, M.S.W.
and
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For the past two years we have been engaged in a research project concerning the rehabilitation of chronically disabled rheumatoid arthritic patients. The objective has been to determine the feasibility of a combined program of hormone therapy and of Physical Medicine and Rehabilitation procedures. To be admitted to the study, patients had to be severely disabled, and with a disease process still in an active phase. We have previously reported factors considered most important as assets and as deficits in establishing and attaining goals with such chronic arthritic patients. Among these, the psychosocial aspects of the problem have loomed prominently as conditioning factors.

Much has been published supporting the hypothesis that the psychological constitution of the rheumatoid arthritic is of such consistent similarity as to warrant its consideration as specific to this disease. Some investigators have proposed further that this "rheumatoid personality" is a stigma which precedes the disease and predisposes psychosomatically to its development as a clinical entity.

We have been interested in learning more about the possibility of any personality structure characteristic of arthritics, and the influence of any such characteristics on the possibilities for rehabilitation. Further, and more important, since rehabilitation is a protracted and expensive investment, we have been concerned with how one might sort out the motivated from the non-motivated patient. In a previous report, the high incidence of passivity and dependence in the chronic rheumatoid group was stressed. As we have analyzed and evaluated subsequent patients, efforts have been made to establish psychosocial common denominators among the successful and unsuccessful groups of rehabilitees, which could be used as yardsticks for selection of patients, and thus more soundly guarantee a satisfactory result.

Any method for establishing these desired criteria admittedly has shortcomings unless the differential is a marked or unanimous one. We have elected to analyze the most obvious failures and successes and have confined ourselves accordingly to small groups of patients. On the other hand, to offset this small number, the psychological and social investigations in all patients have been exhaustive and observations of patients have been extended ones over periods of many months of hospitalization. In the first year of the arthritis rehabilitation study, 239 patients were seen as candidates referred for rehabilitation. From this large group, 37 were selected as being severely disabled and with a disease process still in an active phase. This group was hospitalized and treated by a staff which devoted full time to the study. It was from this group of hospitalized patients that the staff then selected 12 patients, half of whom were unanimously considered failures, and the other half successful rehabilitees. The psychosocial data on these two groups were then analyzed in detail and an

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Cortisone has been generously supplied by Merck & Co.

effort made to establish common denominators in the two groups which might indicate positive and negative values. By definition, the successful rehabilitee was one who was able to utilize physical resources up to a reasonable maximum. Conversely, the unsuccessful patient could utilize few or none of his physical resources and made little or no attempt towards self-care or independent living. With the exception of one, all cases have been under extensive observation from six to twelve months. Selection of the groups was based on common agreement of the medical, social and psychological staff. Patients not clearly classifiable as successful or unsuccessful were not used but are now being used for testing hypotheses developed in the comparative analysis.

Psychosocial data used in this study were obtained during hospitalization. Initially, on admission to the project, each patient was seen by both the psychologist and the social worker. During the social worker's initial interviews, an attempt was made to obtain a comprehensive history of psychosocial development from early childhood through the onset of the arthritis and the patient's subsequent adjustments to his illness. The psychologist's initial evaluation was on a psychological test basis, including the Wechsler-Bellevue; projective tests including the Thematic Apperception Test, the Rorschach Ink Blot Test, Figure Drawing Test; also vocational tests, such as the Kuder Preference, the Purdue Pegboard, and others as indicated.

With this reservoir of data, the social worker and the psychologist then discussed the patient from a psychosocial standpoint with the psychiatrist and from this conference a plan for subsequent follow-up was formulated. The plan for treatment depended upon the patient's capacity and desire for developing and utilizing insight, his quality of adjustment, and the nature of environmental, social and emotional problems. In some instances an intensive treatment relationship was instituted utilizing but one therapist to avoid a diffuse relationship with both the psychologist and the social worker. Other patients were able to utilize support only in limited areas and with superficial problems. Decisions for support or treatment naturally were subject to change during hospitalization, such changes generally arising as a result of joint conferences which included all staff members. Evaluation of changes, problems and treatment was facilitated by weekly staff meetings to give overall insight into the meaning of a patient's behavior, and to enable all staff members to have a continuing knowledge of a patient's over-all progress.

In summarizing the extensive psychosocial information, tabulations have been divided into three principal sections:

1. LIFE HISTORY DATA: characteristics of experience from early childhood to the present.
2. PSYCHOLOGICAL CHARACTERISTICS: test results indicating functional intelligence, ego strength, sexual identification, etc.
3. CHARACTERISTICS OF REHABILITATIVE PROCESS: patient's goals, participation in treatment, attitude toward psychosocial service and other factors reflecting patient's adjustment in the hospital.

Results as presented here are of necessity preliminary, since the Research Project is now terminating only the second of its projected five year course. Furthermore, contacts with patients are continuing on an active basis and are constantly revealing new information.

In considering the successful versus the unsuccessful rehabilitee, we shall consider only that psychosocial data differentially significant and will for brevity eliminate extraneous data. The differences in Life History and Psychologic Data are to be seen in the following tables.

The characteristics of participation in the rehabilitative process are shown in table form. Because of the wide variance of reaction the data are numerically more specifically analyzed. Extraneous data again are omitted.

Life History Data:	Successful	Unsuccessful
1. Early Family Background:		
a) Birthplace:	See nd-generation American, or more.	No second-generation Americans.
b) Socio-economic status:	"Poor" early socio-economic background.	"Fair" or "good".
c) Religious training:	Moderate religious practices.	Strict religious practices.
2. Adult Social Adjustment: Heterosexual Adjustment:		
a) Age began dating	In mid or late teens.	In early teens or after age 20 years.
b) Nature of marital relationship:	No present marital conflict. (Either terminated unsatisfactory marriage or did not marry)	Marked marital conflict with inability to resolve or terminate unsatisfactory marriage.
c) Age at marriage:	If married, marriage at reasonable age (19-25).	Marriage outside of usual age range premature or delayed.
3. Education and Work:		
History: a) First employment:	All began work in teens. Little direct pressure to begin work and no pressure against working.	Delayed employment for some (after age 20) with pressure against working. Other cases with great pressure to begin working. (Only one patient had freedom to make decision to begin work.)
b) Adult economic achievement:	Maintained a "fair" or reasonable standard of living.	"Poor" standard of living.
c) Changes in economic situation from early childhood:	Attained status superior to early family economic status. No decline.	Remained in same status or declined.
4. Situation Prior to Illness:		
a) Financial independence: (no essential difference in occupations between groups, therefore not a factor)	Financially independent for five years prior to onset (except two who were under working age for part or all of five years preceding onset)	Most were financially dependent, or partially dependent.
b) Living arrangement:	Maintaining home independently or with spouse (2 were 20 years or younger and were in parental home)	Half failed to establish independence.
c) Patient's evaluation of health prior to onset: (covering previous 10 - 15 years)	Good physical condition and functioning well.	Most considered themselves "poor" or only "fair".
5. Onset and Course of Disease.		
a) Duration of illness:	Variable, with range of 1 to 33 years and median of 8 years.	More homogeneous. Range 4 to 12 with median of 8 years.
b) Course of disease:	Flare-ups followed by periods of improvement.	Tendency for progressive course of the disease.
Psychological Data:		
A. Intelligence:	Low-average (or better) verbal intelligence.	Borderline verbal intelligence.
B. Ego Strength:	More adequate ego-strength.	Less adequate ego-strength.
C. Controls:		
1) Emotions:	Control and/or repression of emotional reaction.	Uncontrolled emotional reactions; impulsivity and egocentricity.
2) Fantasies:	Control and/or repression of fantasies.	Fearful, uncontrolled fantasies.
3) Depression:	Desire and capacity for pleasurable experiences far outweighing depressed mood.	Depressed mood tends to obscure and displace pleasurable experiences. This results in a chronic depressed state.

4) Orality:	Little evidence of oral concern.	Strong oral needs shown in concern with food and drink. Chronic feelings of failure to achieve oral gratification.
5) Body image:	Relatively adequate image of one's body. Includes adequate differentiation of all parts, presence of all extremities, adequate size.	Inadequate, distorted bizarre body image. Frequent lack of differentiation, missing parts of the body, poor line, etc.

Progress in Rehabilitation:	Successful	Unsuccessful
Patient's attitudes toward rehabilitation:		
Goals:		
Non-specific, vague, confused or inconsistent:	2	4
Specific but not realistic:		2
Specific and realistic:	4	
No goal:	0	0
Predominant attitudes toward illness:		
(Including disfigurement)		
Accepts illness by adapting to life within limitations but with maximum function and without undue conflict:	4	
Accepts illness as chronic invalidism as a way of life providing some satisfactions and without apparent conflict or need for change:		3
Resigned — little or no hope for improvement, but some conflict over adapting chronic invalidism as a way of life:	1	1
Non-accepting, markedly depressed and hopeless; embarrassed by helplessness or disfigurement:	1	
Non-accepting — denial of reality, waiting for miracle; determined to achieve recovery:		2
Predominant Attitudes Toward and Use Made of Psychosocial Service:		
Resentment toward any interest and/or denial of any problems and/or fear of attempts at understanding:	1	1
No interest or passive acceptance:		1
For control of environment (including help with environmental problems):	4	5
For emotional support:	1	2
For development of insight:	3	1
Degree of focus on hypochondriacal complaints shown during interviews with psychosocial staff:		
Extensive emphasis on complaints:		2
Moderate emphasis:	2	2
Limited emphasis:	4	1
Undetermined:		1
Degree of responsibility and participation patient shows in treatment:		
Little or none:		4
Limited to fair:	3	2
Moderate to good:	1	
Excellent:		2

Reaction to dependency:		
Aggressive and demanding; no indications of observable conscious conflict:		1
Passive acceptance with no observable conflict:	1	1
Aggressive and demanding or assertive with conscious conflict as indicated by alternating periods of aggression, denial or needs for help, etc.:		3
Passive acceptance, but with some apparent conflict, fears, asking for help:	5	1

In conclusion, we can tentatively say that on the basis of psychosocial data to date the most successful chronic rheumatoid arthritic rehabilitee has been a second generation American of poor early socio-economic status and of moderate religious practice. He has been more capable of handling heterosexual conflicts. In situations of marital discord, the successful rehabilitee was able to take decisive action in terminating the relationship. He began work early without direct pressure and maintained a good work history. Economically, he attained a fair or reasonable standard of living superior to that of his early family status and maintained his home independently with his spouse. Financially, he had been independent for at least five years prior to the onset of his illness. The median length of illness and the median age at onset of illness were essentially the same as of the unsuccessful rehabilitee. Among the successful patients there was much greater variability both in the duration of the illness and the age of onset. The successful rehabilitee's attitude toward illness generally was one of acceptance of life within limitations but with maximum function and without undue conflict. His goals in rehabilitation, in contrast to the vague, confused, unrealistic ones of the unsuccessful candidate, were usually specific and realistic. His use of the psychosocial department in the hospital tended to be more for control of the environment and for development of insight. In contrast to the unsuccessful, his degree of focus on hypochondriacal complaints was of only moderate or minimal degree. While he showed passivity and acceptance, it was with some conflict and considerable fear and reluctance of asking help from others; this was a sharp difference from the unsuccessful, who was aggressive and demanding in his reaction to dependency. Psychologically, the successful rehabilitee was of low-average (or better) verbal intelligence with adequate ego strength; he showed control and/or repression both of his emotional experience and his imaginative experience and his desire and capacity for pleasurable experiences far outweighed his depressive mood. There was relatively little oral need or concern with this and an adequate image of his body without distortion or bizarre interpretation. The unsuccessful candidate showed the opposite of these psychosocial features to such an extent that we now feel the foregoing distinctions to be possible criteria for prognosticating which chronic arthritis may be good risks for acceptance into rehabilitation programs. These are the factors which are suggestive indices for measuring motivation of a chronic rheumatoid patient.

Prescription for Mobilization in Paralytic Conditions

Duane A. Schram, M.D.
Seattle

Mobilization has reference to the means of attaining or maintaining normal body alignment; it is undoubtedly the most important treatment measure utilized in the care of the neuro-muscular residual case. Muscle re-education, strengthening exercises, and functional training have their relative importance as basic treatment measures, but in the majority of cases, these modalities are secondary to the concomitant mobilization procedures prescribed in an over-all program.

If the body segments are not in alignment the patient will be unable to utilize fully his available muscle strength and will be unable to reach maximum function. Also, malalignment would encourage future degenerative changes and certainly is undesirable cosmetically.

The existence of deformity is not always apparent, and in many cases contractures or tightness are not recognized. There are occasions when a patient may be found on observation to be out of alignment. An example is a standing patient who has an increased lordotic curve due to tight hip flexors and low back which forces him to throw his shoulders backward to keep his balance. Also, these same tight hip flexors may go unrecognized because of faulty technic in examination. If the low back is not kept fully *flexed* in examining the *anterior hips*, errors may be made. In testing contracted iliotibial bands, not only should the low back be flexed but also the anterior superior spines should be held at a true right angle to the body axis if abnormal tightness or contractures are to be recognized (fig. 1).

When a contracture is apparent it is important to estimate the degree of immobility so that adequate mobilization procedures may be prescribed. A reasonably accurate estimate of the degree of tightness may be gained only through experience, and even the experienced examiner in many cases may find it necessary to give conservative measures a trial before more radical procedures are considered. In estimating tightness,

Fig. 1 — Conventional position for testing hip tightness is illustrated. The left leg is extended more than usual to show alignment of anterior superior spines. The back is also slightly extended when pressure was exerted on the tightness in the anterior and lateral right hip. A hard table surface is absolutely necessary in carrying out the examination.

it is essential to consider the age of the patient and the age of the contracture. The older individual has a tendency to develop tough fibrous tissue more readily than the child; also, the longer the contracture has existed the more fibrous it may be. In examining the patient, it is necessary that the tightness be tested, not only by passive stretching, but also by palpating the area. After recognizing the degree of tightness, it is equally important to estimate the normal range of motion so that the additional mobility desired can be determined. With the area located and the degree of limitation known, the question arises as to the choice of procedure. The severity of procedure prescribed will vary directly with the degree of immobility. Mobili-

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Chief, Physical Medicine and Rehabilitation Service, VA Hospital, Seattle; formerly Medical Director, Gonzales Warm Springs Foundation, Gonzales, Texas.

Fig. 2A — Conventional Klenzak ankle hinge which has an adjustable spring to adjust appropriately the mobilizing tension necessary for mild to moderate contractures of the heel cord. In moderate to severe contractures, it may be necessary to consider using the heavy dorsi-flexion springs with a metal foot plate.

zation procedures vary from mild manual stretching to major surgery.

Manual Mobilization

Undoubtedly the most common type of mobilization procedure utilized is active assistive manual stretching. In manual stretching, it is essential that the patient helps actively in the maneuver, if possible, to make sure that the area mobilized is relaxed reflexly when the exercise is performed. The more actively this manual type of exercise can be given, the greater is the assurance of satisfactory results.

Mobilization With Apparatus

When tightness or contractures are moderate (or more) in degree, it may be necessary to use apparatus. Manual stretching has its place as a basic mobilization procedure but it is limited mostly to mild cases. It is more effective to exert a constant mild tension over a relatively long period of time than a moderate manual stretching force for a few moments in a twenty-four hour period. With apparatus, the mobilizing force utilized is spring tension or gravity; and this force is continued for as long a time as indicated in each case. The time depends upon the degree of immobility and tolerance of the soft tissues. An example of spring tension in mobilization is the

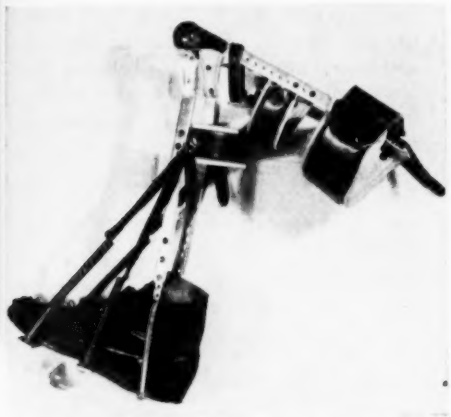

Fig. 2B — Heavy dorsi-flexion springs with a metal foot plate. The heel must be well down in the shoe with the foot held in slight varus if possible. A wide shoe strap over dorsum of the foot may be needed in some cases.

Fig. 2C — Conventional long leg brace to which an extension is added to the upright above so leverage can be exerted toward extension with spring tension. The knee pad is lined with heavy sponge rubber for protection over the fulcrum of a three point lever system.

use of a Klenzak hinge or dorsi-flexion springs at the ankle on a long leg brace to mobilize a heel cord (fig. 2a and 2b). For contractures of the knee flexors, a long leg brace with an extended arm for traction is recommended (fig. 2c).

An example of utilizing gravity is the application of long leg braces with cross bar and corset to stretch out the anterior and lateral hips. A cross bar between the braces splints one leg to the other resulting in limited lateral and longitudinal movement. The corset prevents the pelvis from rotating. By adjusting a Bradford frame to the desired angle a constant mild pressure can be exerted in the anterior and lateral areas of the hips. (fig. 3 and 4).

Surgery

In cases in which there are severe contractures it may be necessary to call upon the surgeon for assistance. In surgery, the most offending structures are sectioned; this is followed by conservative mobilization. To continue with the example of tight hip flexors and iliotibial bands, we find the most offending structures are the superficial tendons and fascia and in many cases the deep fascial structures in the anterior hips. For release of lateral tightness, a "Yount" type of fasciotomy with section of the iliotibial band along with the inter-muscular septum immediately above the knee will release the tightest structures. Surgery is then followed by conservative

Fig. 3 — Patient shown on a Bradford frame with equipment. It is necessary that the corset be molded perfectly to prevent the pelvis from rotating. The points of pressure are the mid back and sacrum posteriorly and the anterior superior spines in front. The angle of the frame is determined by the degree of tightness. Only mild to moderate pressure should be exerted.

Fig. 4 — Corset designed for three point presure to prevent the pelvis from rotating is illustrated. Corset is fitted and applied with the hips in a flexed position.

traction using long leg braces and corset to mobilize all the remaining soft tissues that have accommodated to the contracted position. There are occasions when a minor surgical procedure will suffice. In many cases a moderately tight iliotibial band can be sectioned under local anesthesia, and this procedure is again followed by traction using apparatus. This latter procedure may significantly decrease hospitalization time.

Discussion

It should be emphasized that when apparatus is used with or without surgery it is necessary that personnel be trained to carry out the procedures accurately. If there should be inadequate control or frequent change of personnel this technic will be found impractical. If trained personnel are not available, other measures will of necessity be used. Plaster is utilized in most centers where reconstructive work is done. By using plaster casts and wedging, with or without surgery, it has been found that although the patient is immobilized he is held in a position of choice and the surgeon is certain the patient will remain in this position until a change of cast is made. In other words, the surgeon is forced to immobilize to be sure his procedures will be carried out accurately. If stable personnel who can be trained to work with apparatus is available, this more pliable technic would be preferred because the patient can then carry on with other treatment measures at the same time he is on a mobilization program. He can retain not only his strength but actually increases it along with his function; also, general mobilization procedures can be supplemented that will assist his elimination, circulation and certainly his morale.

With the procedure or combination of procedures prescribed and accurately carried out, it is essential that the mobilization be completed within a reasonable length of time and that an optimum amount of tightness be retained. In severely weak extremities it is especially important to leave sufficient tightness for stability. A patient may be as severely handicapped by being hypermobile in and about a joint as he is by being too tight. With optimum tightness and adequate alignment, it is found that a patient will be more efficient in utilizing the available musculature and in this way will increase his functional capacity. With corrrect alignment a patient's appearance is also improved and there is less likelihood of degenerative joint changes in future years.

Summary

Since correct alignment is necessary to achieve maximum function, mobilization is undoubtedly of prime importance in an over-all treatment program for the neuromuscular residual case.

Before adequate mobilization procedures can be prescribed, it is essential that a thorough examination be made and pertinent information regarding the condition be considered.

The more versatile mobilization method of using apparatus, with or without surgery, is not practical if the associate personnel cannot be trained and retained.

In attaining the desired range of joint mobility, it is important to leave an optimum amount of tightness for stability in severely weak extremities.

The Role of the Physiatrist in a Convalescent Hospital

Edward J. Lorenze, III, M.D.
White Plains, N. Y.

The purpose of a convalescent hospital is to provide in-patient care for cases which do not require the extensive facilities of a general hospital, thus making available as many general hospital beds as possible for cases actually requiring such facilities. The convalescent hospital carries out its purpose of keeping general hospital beds available in two ways: first, by early transfer of patients from general hospitals; and second, by admission of patients directly from home. In the latter instance, the patients might otherwise be unnecessarily admitted to the general hospital, or might deteriorate to the point where such admission becomes essential. Both in this situation, and by contributing to maximum recovery, the convalescent hospital plays a preventive role in limiting recurrences and readmissions.

The need for convalescent beds is always in direct proportion to the demand for general hospital admission. As this demand for general hospital beds for acute cases is greater than the supply, it is essential that early discharge from the hospital be the rule. Since many of these cases still require in-patient care, and are unable to return directly home, the convalescent hospital fills this gap in the continuity of medical care. It is presumed that the physical condition of the transferred patient will improve to permit his return home, but at times it is difficult to prognosticate accurately, and subsequent arrangements for relatively permanent placement must be made. Wherever possible, however, if circumstances permit, (both in terms of time and/or adequate evaluation), the discharge plan of the general hospital should aim at referral of the patient directly to the most appropriate type of facility. The possibilities range from the rest home for cases requiring little or no medical or nursing care, through nursing homes, homes for the aged, and boarding homes, to chronic disease hospitals. The convalescent hospital provides an opportunity for accurate determination as to whether long term or permanent institutionalization will be necessary in those cases which are not clearly defined.

All of the aforementioned facilities serve a role in relieving general hospital beds by providing for various needs. The following are the essential elements of a convalescent hospital: 1) it provides in-patient medical and nursing care; 2) the basic consideration for admission is the possibility of improvement; 3) the length of stay is temporary, and dependent upon continued improvement; 4) permanent custodial care is not provided and 5) social factors alone are not cause for admission.

To function most effectively, provision must be made to take patients early, and in many instances, while individuals are still bed patients. This, of course, demands nursing care, including an increasing proportion of bedside care, special diets, and routine laboratory facilities, as well as close medical supervision. In the past, because of inadequate medical supervision and services, sick patients could not be admitted or cared for, and the result was that the cases were almost in a normal state of health. Social factors, rather than purely medical needs were often the predominant causes for admission. It should not be the aim to turn the convalescent facility into a general hospital, as this defeats its purpose, but much in the way of medical and nursing care is needed. Extensive diagnostic and therapeutic equipment is, of course, not

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Medical Director, Burke Foundation, White Plains, N. Y.

to be duplicated. In this category, one would include operating rooms, extensive X-ray equipment, pathology and anesthesia departments, all of which contribute to the over-head and expense of every general hospital bed. With this overhead removed, however, the convalescent facility is able to care for sick patients and bed cases at considerably less cost. By the same token, the convalescent facility is unable to provide diagnostic services of an extensive nature, and is dependent for this upon the referring hospital or physician. There must also be provision for the rapid transfer to general hospitals of patients whose needs exceed the facilities available. While progress has been made toward early admission of patients, it continues slowly, because of the lack of interest on the part of physicians who see little need for their professional abilities in this sphere of activity. A vicious cycle is thus created. The physician lacks interest because the patients are not sick. The Board of Directors will not approve the policy of admitting sick cases because of lack of medical and nursing personnel, and because of the consequent increase in expenses. Individual patients who can afford fees which would cover the expense do not choose to come, because by the time they are able to meet the physical requirements, they are able to stay in their own home, or take a vacation. Agencies providing for those unable to pay their own way will not pay more for what they consider rest homes, yet at the same time, point out the need for extending services. This cycle can be broken only when physicians take the initiative in developing the necessary services. The physician must be not only the dispenser of medication; he must also provide the stimulus and guidance for this development. When services are provided to meet the community needs, the community will find the means to finance it, both individually and collectively. It is only by the physician's efforts in showing the way that convalescent facilities can play their full role in medical care.

The possibility of improvement is a fundamental consideration for admission to a convalescent facility, and rightly so. Interpretation of what is to be considered improvement is, however, necessary. Improvement should be relative, and may only be to the extent that the patient coming from a hospital may be improved to the point that he can go to a boarding home rather than a nursing home, or can be brought to a level suitable for admission to a home for the aged. Improvement should be considered in terms of the individual's best potential function, or adjustment to his condition. Great latitude must be allowed in evaluating an individual's chances of improvement in these terms. The length of stay should also be open to variation, and not arbitrarily limited to several weeks, as is often the case. There should be no limitation as long as the patient is improving under the therapeutic regimen. When, however, a plateau is reached, the discharge plan developed during the patient's stay should be set in operation. Permanent custodial care should not be undertaken, since the convalescent hospital must have a free flow of patients in order always to have beds available for general hospital needs. The opportunity for improvement depends on the type of cases admitted, the problems they present, and especially the facilities available to solve or ameliorate the problems.

The types of cases admitted today in a general convalescent hospital differ somewhat from those seen prior to the use of chemotherapeutic and antibiotic agents. Acute infectious diseases do not leave patients in the rundown condition seen in former days. Likewise, uncomplicated surgical problems do not usually require prolonged periods to regain their strength. Unless this group comes early in their course, they often do not need the services of a convalescent hospital, and can be cared for in their own homes, or in rest homes. As in other branches of medicine, our cases primarily fall into the chronic disease category, with increasing numbers in the older

age group, and into what might be considered a psychosocial vocational category. In this latter group are individuals whose physical disease or symptoms are caused, aggravated or complicated by emotional disturbances with accompanying sociological and vocational problems. In those convalescing from acute conditions or exacerbation of chronic disease, the psychosocial vocational problems may be of greater importance than the organic disease in many instances.

Finally, we are faced with those cases with orthopedic and neurological conditions who are unable to ambulate and care for themselves, and who are very frequently rejected for admission. Such cases require the attention of conventional physical medicine and rehabilitation services.

These, then, are the types of cases and problems which confront the convalescent facility. It is obvious that in order to cope with them, rest, fresh air and nutritious food are insufficient to attain maximum improvement. The best in medical and nursing care is required; secondly, extensive psychosocial and vocational services must be developed, and by that is meant professional guidance and counseling, as well as programs for actual pre-vocational testing, and the development of work-tolerance; for the last group, a complete program of treatment including physical medicine, the rehabilitation technics of retraining in the activities of daily living, and speech therapy is required.

The primary obstacle to the development of this type of program has been the tendency to consider convalescent care as something different from rehabilitation. In the numerous descriptions of ideal programs, the same factors have been pointed out as essential in both instances. Despite this, new rehabilitation services and centers have been established, actually providing the services only talked about in the older convalescent institutions. Our present rehabilitation programs have developed because of a dynamic philosophy, which has aroused the interest of physicians. If convalescent programs are to develop to the point of maximum effectiveness, the advances will be a result of the interest and efforts of physicians, who look upon it not as just a period of time between illness and health wherein the natural restorative powers of the body take over, but rather at a time when the patient is beginning to realize the consequences of illness, and may require an infinite amount of specialized care. This will occur when the physician recognizes that the dynamic philosophy and principles of rehabilitation in the broad sense are the essential ingredients of convalescent care. Until we accept the fact that convalescent care has the same objectives as rehabilitation, as defined by the Baruch Committee on Physical Medicine and Rehabilitation, and that rehabilitation is the process that occurs during the convalescent period, little progress will be made. We must recognize that ideal convalescent care is, in fact, rehabilitation.

Physiatrists as a group might logically be expected to develop an interest in the convalescent field and see the possibilities of the application of the rehabilitation concept. They are experienced in the administrative aspects of medical care, and in the coordinated group, or team approach to medical problems. They have adopted as a principle in their specialty practice that the psychological, social and vocational aspects of a case are integral parts of the individual's medical problem, and accept as their responsibility the solution of this problem for the particular patient. The physiatrist has an understanding of chronic disease, and appreciates the importance of ameliorating a condition, if a complete cure is not available. The goal of maximum adjustment and function within the limitations of a disability is not something for lip service, or an impractical, idealistic catch phrase; it is the fundamental working hypothesis of every physiatrist. In fact, the concept of rehabilitation, as defined by the Baruch Committee, because of the efforts and examples of physiatrists, is being accepted definitely by the medical pro-

fession as one of the basic tenets of the philosophy underlying the practice of medicine. In this light, it is taking its place with prevention, diagnosis and specific treatment, as the "fourth phase of medicine."

The physiatrist has, in this situation, an opportunity and a responsibility, for he is among those who can most readily see that the broad rehabilitation principles, which we have applied to orthopedic and neurological cases, are equally applicable to all medical and surgical cases during the convalescent period. In these other types of cases, of course, the role of physical therapy may play little or no part, but general reconditioning exercises, work tolerance programs, and progressive physical activity are not far afield. Likewise, our concept of training in the activities of daily living need not be limited to the problems of the extremities, but can be extended to colostomy care, the training of diabetics in urinalysis, skin care, insulin dosage and dietetics, and the training of cardiac and pulmonary cases to live as efficiently as possible within their functional capacities.

Summary

An analysis of the function of an adult general convalescent hospital, as well as some of the methods by which this function can be performed, has been presented as a result of our experience at the Burke Foundation. Physiatrists can contribute to the development of convalescent facilities in three ways: 1) By improving and expanding the use of physical medicine for general convalescent patients; 2) by developing complete rehabilitation programs for severely disabled cases of an orthopedic or neurological nature, and 3) by taking an active role in convalescent facilities, and advocating the application of the broad principles of rehabilitation as the underlying philosophy of convalescent care for all types of cases.

Discussion

Dr. Nila Kirkpatrick Covalt (Muncie, Ind.): Dr. Lorenze has placed negative emphasis upon the numerous problems under consideration. Instead of leaving this important subject on the debit side, I must discuss it by pointing up some of the positive and dynamic aspects. I believe his first statement should be amended to read: "The purpose of a convalescent hospital is to serve as a rehabilitation center, auxiliary to a general hospital, providing in-patient care for cases which do not require the extensive facilities of a general hospital . . . but in the meantime shortening the period of convalescence by the use of such rehabilitation technics as are indicated."

The need for early rehabilitation, particularly the prevention of physical helplessness and the retraining in Activities of Daily Living should be kept in mind for every patient who enters any general hospital. Training in these activities should be started immediately when any patient has need of them, and then continued into the convalescent hospital program. There should be no lag-time in this form of medical treatment.

Technics in Activities of Daily Living are not skills that require long practice or education on the part of the instructors. They require a little "know-how" of minor technics, but mainly they require common sense and the philosophy and concept of the purpose and goals of rehabilitation. These procedures can be initiated in any general hospital and every convalescent home without a full time physiatrist or a staff of physical and occupational therapists. The results will be effective enough to emphasize the fact that even better results could be obtained with a specialist staff, and that a full-time staff would be more effective than a part time or consultative one.

A dynamic constructive program can be started in this manner:

1. Secure the service of a doctor with the concept and philosophy of rehabilitation to serve as the spark plug, salesman and coordinator of the program. If that physician is not the medical director or hospital admin-

istrator himself, then he must first sell that director;

2. Provide consulting physiatrist to indoctrinate the entire staff by means of one or two lecture discussions and demonstrations (This individual should serve as a regular consultant whenever possible);
3. Procure the (temporary) services of a physical therapist to instruct the entire staff in Activities of Daily Living and in crutch fitting and crutch walking. Three to six one-hour lecture periods will suffice. In my opinion, this should be mandatory training for every nurse, aide, orderly and attendant in every hospital;
4. Issue standing orders that all patients will receive the individually required training in self care or walking by everyone who serves the patient; this should include private patients if their individual physicians will permit;
5. Arrange to transport patients to PM&R Clinics as out-patients when more definitive treatment is needed (This is in preference to calling in therapists for individual treatments in the convalescent hospital);
6. Provide for the establishment of a Rehabilitation Board or Evaluation Clinic meeting once or twice monthly to develop a total program for each patient. This board should include those in the hospital directly concerned with the patient, the consulting physiatrist and therapists, as well as the social workers and vocational counselors particularly concerned with the patients under discussion;
7. Provide for the employment of a full-time program director, preferably one trained in recreation who will plan a program with at least 80% of active patient participation (Keeping patients active and interested when not undergoing actual medical treatment is known to speed recovery), and
8. Ask volunteers, preferably hospital board members, or their friends to assist in every possible way so that they too will become interested members of the rehabilitation team.

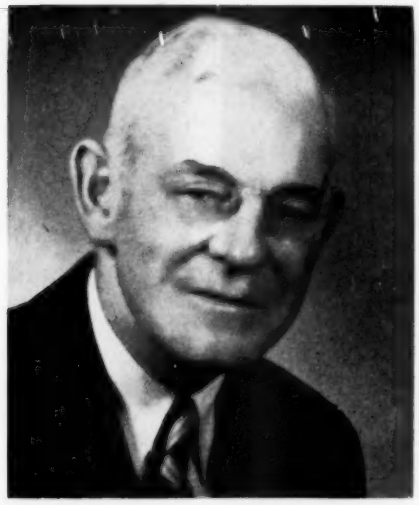
The numerous problems that Dr. Lorenze has mentioned are there to be solved. However, with a dynamic action program, some will solve themselves; others will have to be solved from necessity. The necessity becomes apparent when there is action, no matter how small in amount.

ANNUAL ESSAY AWARD . . .

Papers submitted for this award have been reviewed and it is the decision of the Committee that no award be made for 1954.

Committee on Prize Lecture
William D. Paul, Chairman
O. Leonard Huddleston
Frederic T. Jung
Walter S. McClellan

AWARDS OF MERIT FOR THE YEAR 1954



George Morris Piersol

The Committee on Gold Key Award announced for its Chairman, Dr. Howard A. Rusk, the following recipient:

GEORGE MORRIS PIERSOL, M.D., Philadelphia, Physician, Educator and Humanitarian: Dean of the University of Pennsylvania Graduate School of Medicine: Who has earned the respect of his associates by his wisdom, counsel, good-will and fellowship; has served the cause of medical education long and with distinction; has fostered the advancement of Physical Medicine and Rehabilitation through the development of training areas for students and physicians; has contributed extensively to medical literature; who, by his tireless efforts and many accomplishments has notably advanced the Science and the Art of Physical Medicine and Rehabilitation.

Awards to Scientific Exhibitors

The Committee on Awards for Scientific Exhibits presented through its Chairman, Dr. Donald A. Covalt, the following:

Gold Medal to Odon F. von Werssowetz, M.D.; Rose Elliott, O.T.R.; Betty Schlosser Riess, A.R.P.T., and R. N. Witt, for the exhibit "Assistive Supports in Rehabilitation of Paralytic Hand."

Silver Medal to Louis N. Rudin, M.D., and Daniel J. Cronin, for the exhibit "Mechanical Substitutes for Paralyzed Muscles."

Bronze Medal to Delilah Riemer, M.D.; James N. Burrows; Raymond E. Nilson; Charles M. Kinnard; Dorothy B. Dickens; Raymond W. Slater, and O. W. Feri, for the exhibit "The Rehabilitation of the Psychiatric Patient."

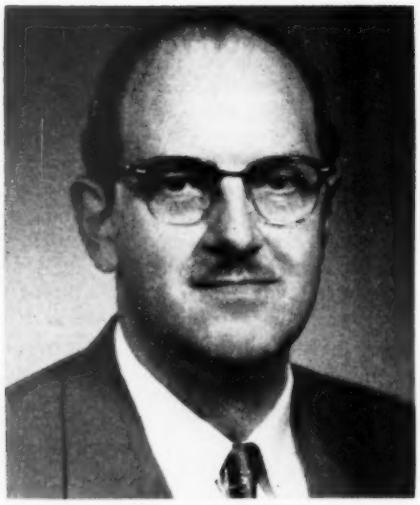
Introducing . . . . .

Congress Officers for 1954-55

President
William D. Paul
Iowa City

Secretary
Frances Baker
San Mateo, Calif.

Treasurer
Frank H. Krusen
Rochester, Minn.



Executive Director
Walter J. Zeiter
Cleveland

MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION OFFICERS 1955

William D. Paul, Iowa City, Iowa, President.

Howard A. Rusk, New York City, President-Elect.

Gordon M. Martin, Rochester, Minn., First Vice-President.

A. B. C. Knudson, Washington, D. C., Second Vice-President.

Donald L. Rose, Kansas City, Kans., Third Vice-President.

Arthur C. Jones, Portland, Ore., Fourth Vice-President.

Frederic J. Kottke, Minneapolis, Fifth Vice-President.

Frances Baker, San Mateo, Calif., Secretary.

Frank H. Krusen, Rochester, Minn., Treasurer.

Walter J. Zeiter, Cleveland, Ohio, Executive Director.

Dorothea C. Augustin, Chicago, Executive Secretary.

Earl C. Elkins, Rochester, Minn., was elected to succeed himself to serve a term of six years on the Editorial Board of the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

Walter M. Solomon, Cleveland, Ohio, was re-elected Chairman of the Editorial Board for a period of one year.

O. Leonard Huddleston and **A. B. C. Knudson** were re-elected to succeed themselves on the American Board of Physical Medicine and Rehabilitation as representatives of the American Congress of Physical Medicine and Rehabilitation.

Charles S. Wise, Washington, D. C., was re-elected to succeed himself on the Finance Committee.

Wm. Benham Snow, New York City, was elected to serve a term of seven years on the Board of the American Registry of Physical Therapists, beginning January 1, 1955. **Earl C. Elkins**, Rochester, Minn., was re-elected Chairman; **Robert L. Bennett**, Warm Springs, Ga., was re-elected Vice-Chairman of the Registry Board.

Robert L. Bennett was re-elected Chairman of The American Board of Physical Medicine and Rehabilitation; **William H. Schmidt**, Philadelphia, was re-elected Vice-Chairman, and **Earl C. Elkins** was re-elected Secretary-Treasurer.

NEW CONGRESS MEMBERS

The following were elected to membership in the American Congress of Physical Medicine and Rehabilitation at the recent meeting in Washington, D. C.:

Axling, J. Lynn, 1851 Larch St., Longview, Wash.

Bendler, Eleanor M., 3600 Spruce St., Philadelphia 6.

Brown, Joseph E., 10515 Carnegie Ave., Cleveland 6.

Bulmer, James W., Box 82, Woodstock, Vt.

Cooper, Albert Lewis, 742 Medical-Dental Bldg., Seattle 1.

Crow, Richard D., 803 Jordan St., Shreveport, La.

Cruce, William V., Brooke Army Hospital, Ft. Sam Houston, Texas.

Dean, C. Robert, 8811 Hamilton Ave., Detroit 2.

Dixon, George G., VA Hospital, Knoxville, Iowa.

Doyle, Bernard J., VA Hospital, 150 S. Huntington Ave., Boston 30.

Dunbar, William, 251 W. Johnson St., Philadelphia 44.

Fleming, Arthur William, 10400 S. Western Ave., Chicago 43.

Goldberg, Jacob, VA Hospital, Castle Point, N.Y.

Green, Robert Lee, Jr., VA Medical Teaching Group Hospital, Memphis, Tenn.

Guth, Paul Henry, Fels Research Institute, Temple University School of Medicine, Philadelphia.

Hess, Emily Rogers, 141 Mayo Ave., Ft. Thomas, Ky.

Jensen, Jacob R., 1514 E. Cold Spring Lane, Baltimore 18.

Kaplan, Lawrence I., 505 Westbury Ave., Carle Place, L.I., N.Y.

Koepke, George H., 2740 W. Central Ave., Toledo 6, Ohio.

Ladwig, Harold A., 7823 Pierce St., Omaha, Nebr.

Lenthall, Theresa U., 3495 Bailey Ave., Buffalo 15, N.Y.

Lessard, Jean M., Hotel-Dieu Hospital, Montreal 18, Que., Canada.

Mims, Harry W., Georgia Warm Springs Fdn., Warm Springs, Ga.

Neu, Harold N., 506 N. Elmwood Rd., Omaha, Nebr.

Nixon, Samuel P., 1211 Country Club Rd., St. Petersburg 2, Fla.

Orris, John A., 500 Somerset Ave., Windber, Pa.

Peszczynski, Mieczyslaw, 2961 S. Moreland Blvd., Cleveland 20.

Porterfield, Jack B., Chief, Physical Medicine Rehabilitation Service, VA Hospital, Kecoughtan, Va.

Reynolds, Frank W., The Saratoga Spa, Saratoga Springs, N.Y.

Richardson, A. T., The Royal Free Hospital, Gray's Inn Rd., London, W. C. 1, England.

Riemer, Delilah, 164 Ward St., Newton Centre, Mass.

Rogoff, Joseph B., 136 W. 16th St., New York 11.

Ryan, William, 2910 Blodgett, Houston, Texas.

Saez, Jose, 50 Central Park West, New York 23.

Scanlan, Thomas J., VA Hospital, East Orange, N.J.

Schaefer, William Carl, 1424 12th Ave. N. E., Rochester, Minn.

Stimson, Cyrus W., Dept. of Physical Medicine, USA Hospital, Ft. Campbell, Ky.

Tramer, Alvyn W., 10515 Carnegie Ave., Cleveland 6.

Varnerin, Emma M., Veterans Hospital, Wood, Wis.

Ward, James P., 1243 N. Nema Ave., Tucson, Ariz.

NEW SOCIETY MEMBERS

The following were elected to membership in the American Society of Physical Medicine and Rehabilitation at the meeting in Washington, D. C., September 7, 1954:

Bonner, Francis J., 125 Argyle Rd., Ardmore, Pa.

Britt, Louis P., Chief, Physical Medicine and Rehabilitation, Campbell Clinic, 869 Madison Ave., Memphis, Tenn.

DeForest, Ralph E., 211 Ninth St., Wilmette, Ill.

Dobrin, Leo, 99-05 63rd Dr., Flushing 74, N.Y.

Donio, Dominic A., 528 Washington St., Allentown, Pa.

Dorinson, S. Malvern, 442 Post St., San Francisco 2.

Furey, Charles A., 2201 St. James St., Philadelphia 3.

Gillette, Harriet E., 73 E. 11th St. N. E., Atlanta, Ga.

Grynbaum, Bruce B., 740 West End Ave., New York 25.

Gullickson, Glenn, Jr., 1730 Irving Ave. S., Minneapolis 5.

Heath, Sherburne W., Jr., 1610 104th Ave. S. E., Bellevue, Wash.

Hirschberg, Gerald G., Medico-Dental Bldg., 2940 Channing Way, Berkeley 4, Calif.

Koczur, Joseph, 10041 S. St. Louis Ave., Evergreen Park, Ill.

Leavitt, Lewis A., 3014 Shenandoah, Houston, Texas.

Marjey, Elemer J., 5251 Netherland Ave., New York.

Moldaver, Joseph, The Neurological Institute, 700 W. 168th St., New York 32.

Moyer, Dwight L., 1166 Wyoming Ave., Forty Fort, Pa.

Nelson, Paul A., Cleveland Clinic, 2020 E. 93rd St., Cleveland.

Park, Herbert W., Department of Physical Medicine, Medical College of Virginia, 1200 E. Broad St., Box 846, Richmond 19, Va.

Rae, James W., Jr., University Hospital, Ann Arbor, Mich.

Samberg, Harry H., Chief, Physical Medicine Rehabilitation Service, VA Center, Des Moines, Iowa.

Schram, Duane A., 4435 Beacon Ave., Seattle 8.

Stillwell, George K., 1518 9th Ave., N. E., Rochester, Minn.

Sverdlik, Samuel S., 77 Margaret Ave., Lawrence, L.I., N.Y.

Tepperberg, Irving, 1610 Metropolitan Ave., Bronx 62, N.Y.

Walsh, Thomas E., 726 W. Onondaga St., Syracuse 4, N.Y.

PERSONALS

Edith Lind Kristeller, New York City, has been appointed the Assistant Medical Director of the Geriatric Rehabilitation Service at Goldwater Memorial Hospital. — **Howard F. Polley**, Rochester, Minn., attended the meeting of the Society for Clinical Investigation in Atlantic City. — A polio clinic was conducted for area physicians at the Mankato Rehabilitation Center by **Earl C. Elkins**, Rochester, Minn. — **Michael Dacso**, New York City, has been promoted to Associate Professor of Clinical Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center. Dr. Dacso spent four days visiting Idaho institutions,

at the request of the state medical care interim study committee. — A paper entitled "Neurology of Osteoarthritis of the Cervical Column" was presented by **Eugene Neuwirth,** Great Neck, N.Y., at the annual meeting of the American Rheumatism Association held in San Francisco. — **David Rubin,** Ft. Sam Houston, Texas, discussed and demonstrated neuromuscular facilitation technics at the VA Hospital, Houston, before members of the Physical Medicine Service Professional Staff; Dr. Rubin also discussed the "Role of the Physiatrist in the Rehabilitation of the Upper Extremity Amputee" as part of a symposium before members of the Texas Chapter of the American Physical Therapy Association held in San Antonio. — The annual Louis Gross Memorial Lecture of the Montreal Clinical Society will be delivered by **Arthur S. Abramson,** White Plains, N.Y. — **George D. Wilson,** Asheville, N.C., spoke at the VA Hospital, Salisbury, N. C., on the topic "Evaluation to Date of High Proteins with Vitamins in Progressive Muscular Dystrophy." Dr. Wilson also addressed the Southeastern Chapter of the American Association of Rehabilitation Therapists on "Use of Exercise in Evaluation of Medicines." — **Elizabeth S. Austin** and **Clarence W. Dail** of Los Angeles discussed the following topics at the annual conference of the American Physical Therapy Association: "Respiratory Problems in Acute Poliomyelitis Patients" and "Weaning the Poliomyelitis Patient from the Respirator." — The new Director of the Department of Physical Medicine and Rehabilitation at the University of Pennsylvania is **William J. Erdman** of Philadelphia. — **John W. Deyton,** has recently accepted the appointment as director of physical medicine and rehabilitation services at the Jewish Hospitals in St. Louis. He will also serve as medical director of the Miriam Rehabilitation Center. — **Howard A. Rusk,** New York City, was principal speaker on September 15 at the sixth world congress of the International Society for the Welfare of Cripples in The Hague, Netherlands. His topic was "Dynamic Rehabilitation." Dr. Rusk was presented with the National Medal of the Republic of Korea at a dinner held by The American-Korean Foundation, Hotel Waldorf-Astoria, August 2. — At the two-day Institute on Rehabilitation Centers, staged by the National Society for Crippled Children and Adults, Inc., **Ben L. Boynton,** Chicago, was one of the participants. — **John H. Aldes,** Los Angeles, participated in the meeting of the American College of Chest Physicians as a Fellow and member of the Rehabilitation Committee of the Hospital Council of the College; he discussed the paper "The Acute Calcium Deposits in the Hand" at the AMA meeting in June. Dr. Aldes also presented a paper entitled "Rehabilitation in Tuberculosis" at the Third International Congress on Diseases of the Chest, held in Barcelona, Spain, October 5. — At the annual meeting of the Sociedad Medico-Quirurgica Del Atlantico of Barranquilla, Colombia, S. A., **Ferdinand F. Schwartz** of Birmingham, Ala., and **Cassius Lopez de Victoria** of New York City were awarded diplomas as corresponding members of the organization. — **Edward P. Reese,** Hot Springs, Ark., spoke on "Physical Medicine's Contribution to the Care of the General Hospital Patient" at the meeting of the District Nurses Association, held in Hot Springs; he spoke at the Staff Conference of the Army & Navy Hospital on the topic "Electrodiagnostic Procedures in Neuromuscular Injuries and Diseases"; he presented a paper entitled "Physical Medicine in Arthritis" at the Educational Seminar of the Army & Navy Hospital; to the volunteer hospital and Gray Ladies of the Red Cross, he spoke on the "Rehabilitation Techniques and Problems," and presented a series of demonstrations and lectures on "Physical Medicine in the Treatment of the Arthritic Patient" to the graduate and undergraduate nurses of the local Hot Springs hospitals. — The section of Physical Medicine of the Massachusetts Medical Society recently elected **Fritz Friedland** of Boston as Chairman; he has also been elected to the position of Assistant Clinical Professor of Medicine at Tufts College Medical School. — **Charles D. Shields** has resigned from the regular Army Medical Service to enter practice in Washington, D. C. Dr. Shields has been appointed Professor and Chairman of the Department of Physical Medicine and Rehabilitation at Georgetown University. — **Joseph Koczur,** Chicago, is on the Medical Advisory Committee of the Rehabilitation Institute of Chicago. — **Major Anthony Brittis,** MC, USA, has been transferred from Brooke Army Hospital to Walter Reed Army Hospital as Assistant Chief, Physical Medicine Service. — **Colonel Clark B. Williams** has been transferred from Wm. Beaumont Army Hospital, Ft. Bliss, Texas, to Office of the Surgeon General, USA, Washington, D. C., to be Chief Physical Medicine Consultant.

NEWLY REGISTERED THERAPISTS

June 3, 1954

Gonzalez, Saida, Los Mirtos 168, Hyde Park, Rio Piedras, Puerto Rico.

June 10, 1954

Tagliente, Mary Savina, 29 Daniels Ave., Pittsfield, Mass.

June 22, 1954

Beaty, Donald Dale, 4750 W. Alabama, St. Louis, Mo.

Brownell, Barbara G., 927 Walker St., Elizabethton, Tenn.
Burke, Alverne E., 1402 S. Hanley Rd., St. Louis, Mo.
Dodd, Nellie Maxine, 1517 Purdue Ave., St. Louis, Mo.
Fritsch, Ann Dorothy, 2039 N. 41 St., Milwaukee, Wis.
Graziano, Joan Mary, 139 Connellsville St., Dunbar, Pa.
Gregory, Rita Therese, 721 E. 104 St., Chicago, Ill.
Haynes, Betty Lou, 1414 N. Wood St., Sherman, Tex.
Jones, Minnie Joycelyn, 2423 N. 11th St., Milwaukee, Wis.
Keathley, Jacqueline Ambler, 22 Hardith Hills Ct., Rock Hill, Mo.
Leue, Nancy Ellen, 406 Lounquist Pkwy., Mt. Prospect, Ill.
Mueller, Harriette Anne, 6413 Pasadena, St. Louis, Mo.
Pearsley, Etta Newton, 7009 Theadore, St. Louis, Mo.
Probst, Catherine Josephine, 1641 W. Farwell Ave., Chicago, Ill.
Siemens, Anne Louise, 316 Crawford Ave., Dixon, Ill.

June 24, 1954

Arbaugh, Donald J., 239 Brookside Rd., Penn Square Village, Norristown, Pa.
Boltz, Robert N., 201 W. Main St., Tremont, Pa.
Brown, Ellis, Jr., 1619 Mead, Racine, Wis.
Brownell, Dorothy Arnold, Indian Ave., Middletown, R.I.
Buttner, Carole Marie, 163 Newburg St., Roslindale, Mass.
Clair, Cynthia York, 17 Dorset Rd., Waban, Mass.
Cove, Phyllis Lorna, 14 Pinehurst Ave., Auburn, Mass.
Cunningham, Barbara Louise, 28 Ardmore St., East Braintree 84, Mass.
Eastep, Jean Louise, 416 Lincoln St., Carlisle 1, Pa.
Gracia, Marguerite Mary, 256 Broadway, Taunton, Mass.
Harbaugh, George Rodney, Fairfield, Pa.
Jacob, Lydia, RFD 2 Windham Rd., East Hampton, Conn.
Koski, Elizabeth Jane, 219 Harvard Ave., Allston, Mass.
Meyer, Jean Margaret, 1077 South St., Roslindale, Mass.
Mitchell, Beverly Jean, West Union St., Box 5, Ashland, Mass.
Mitchell, James Douglas, 38 Oaks Ave., Southbridge, Mass.
Peterson, Charles Lindh, 64 Poplar St., Kingston, Pa.
Plocinik, Corrine Ann, 217 E. Bertsch St., Lansford, Pa.
Schelper, Shirley Ann, 205 N. Water St., New Bremen, Ohio.
Scott, Joan Catherine, 5 Brier Lane, Pelham Manor, N.Y.
Scruggs, Grace Euline, 714 Lee St., Danville, Va.
Stork, Gertrude Ann, McFarland, Kan.
Sullivan, Mary Angela, 8400 Pine Rd., Philadelphia 11, Pa.
Sullivan, Thomas Dwane, 7237 S. Pine, Tacoma, Wash.
Tangen, Joan Christine, 17 Lafayette St., Randolph, Mass.
Tippett, Raymond John, 106 E. Vaughn St., Kingston, Pa.
Toung, Margaret Ann, 380 Varinna Dr., Rochester 18, N.Y.
Wellman, Barbara Noel, 134 Moffat Rd., Waban, Mass.

June 25, 1954

Beatson, Mary Anne, 920 Mayburn, Dearborn, Mich.
Crimmins, Kathleen Cleo, Howard City, Mich.
Croninger, Charlyn A., 9492 Cascade Rd., Ada, Mich.
Hesse, Charles Alvin, 810½ W. Genesee St., Lansing, Mich.
Klukowski, Joyce Mary, 356 Carlton Ave. S. E., Grand Rapids, Mich.
Kolb, Lisa, 543 Pleasant St. S. E., Grand Rapids, Mich.
Krans, Wilma Marie, Rt. I, Iron River, Mich.
Loughlin, Carolyn Mae, 7044 S. Perry Ave., Chicago, Ill.
Morgan, Suzanne Carol, 2702 Kenilworth Dr., Ann Arbor, Mich.
Olmsted, Louise Adela, 131 N. Hanchett St., Coldwater, Mich.
Petrie, Ann Marie, 401 Stimson St., Cadillac, Mich.
Reed, Arbon Lee, 1429 University Terr., Ann Arbor, Mich.
Ryska, Kathleen Ruth, 2345 Pulaski, Hamtramck, Mich.

June 30, 1954

Preibis, Sister Mary Anton, 8400 Pine Rd., Fox Chase, Philadelphia 11, Pa.

July 9, 1954

Cooper, Alice Lee, 8 Emerson Pl., Upper Montclair, N.J.
Gallucci, Robert Rocco, 1415 S. 11th St., Tacoma 6, Wash.
Greenstein, Barbara B., 4155 King's Highway, Brooklyn 34, N.Y.
Griffith, Doff Daniel, Box 44, Harper, W. Va.
Hayes, Joseph Paul, 39-52 46 St., Long Island City 4, N.Y.
Ho-Asjoe, Henry Wai Hong, 2 Homantin

Hill Rd., Kowloom, Hong Kong, Japan.

Knight, Joy Evelyn, 40 Peekskill Ave., Springfield 9, Mass.

Koopman, Doris Harolyn, 730 Atwood St., N. E., Grand Rapids 3, Mich.

Koronkiewicz, Barbara Ann., 280 W. Main St., Nanticoke, Pa.

Lash, Barbara A., 1490 Jesup Ave., New York 52, N.Y.

Ligresti, Emma Theresa, 1064-71 St., Brooklyn 28, N.Y.

McCarty, Jean, Mt. Gretna Heights, Mt. Gretna, Pa.

Mitchell, Ruth Ursula, 11710 Hazeldell Rd., Cleveland 8, Ohio.

Mockler, Helen Luise, 221 Pleasant Ave., Bergenfield, N.J.

Papinchak, Andrew George, 66 Tamaqua St., Beaver Meadows, Pa.

Parman, Carlos Marion, 4225 Pollack Ave., Evansville, Ind.

Schneider, Mary Terese, 507 Montrose Dr., South Charleston, W. Va.

July 14, 1954

Allison, John Duncan, 522 Pearl St., Michigan City, Ind.

Stucki, Ruth Anne, Helena, Mo.

Thomas, Barbara Jean, 2010 Davis St., Elmira, N.Y.

July 21, 1954

Ammen, Frances, 38 Highland St., Hopedale, Mass.

Bloor, Ann, Grand View-on-Hudson, Nyack, N.Y.

Brady, Agnes Rita, 34 Whitwell Ave., Newport, R.I.

Carney, Leona Marie, 77 Dwinell St., West Roxbury 32, Mass.

Childs, Betty Jane, 95 Governor St., East Hartford, Conn.

Couture, Joan Mary, 63 Seventh, Turners Falls, Mass.

Del Bonis, Eleanor Ann, 5 Capeway Dr., Oak Lawn, R.I.

Dingwall, Ann Elizabeth, 83 Myrtle St., Le Roy, N.Y.

Doonan, Diane, 9 Wicklaw St., Malden 48, Mass.

Douglas, Joan Mary, 42 E. Forest Ave., Englewood, N.J.

Gillis, Ann Mayell, 313 Hale St., Beverly, Mass.

Gilman, Jean Constance, 185 Centre, Holbrook, Mass.

Goss, Barbara Ann, Washington St., Middlebury, Vt.

Hawley, Barbara Louise, 25 Deane Ave., Holden, Mass.

Huber, Ruth Ann, 587 Prospect St., Maplewood, N.J.

Krueger, Claire M., 65 Park Dr., Boston 15, Mass.

Long, Flora Marion, 5649 Hillcrest Rd., Downers Grove, Ill.

Mailhiot, Odile Jeanne, 200 Sherman St., Cambridge 40, Mass.

O'Gorman, Annette Marie, Bradford, Vt.

Pitman, Joyce Marilyn, 96 Lake St., Arlington, Mass.

Potter, Dorothy Joan, 33 Medway St., Providence 6, R.I.

Price, Beverly R., RFD 1, Box 358, Manchester, N.H.

Rice, Kathleen Edna, 13 Uxbridge St., Worcester 5, Mass.

Ross, Mary Elizabeth, 35 Grafton St., Shrewsbury, Mass.

Saunders, Elsie May, 121 Commercial St., Weymouth 88, Mass.

Shao, Irene, 161 W. 16th St., New York 11, N.Y.

Silver, Rosalie B., 16 Ransom Rd., Brighton 35, Mass.

Siragusa, Mary P., 24 Lake St., Brighton, Mass.

Smith, Jane, Sebago Lake, Me.

Svehlak, Mildred Frances, 108 High St., Derby, Conn.

Tutin, Susanne J., 9 Revere St., Lexington, Mass.

Walker, Sara MacLean, RFD #3, Centredale, R.I.

West, Shirley Frances, New Britain Ave., Plainville, Conn.

July 26, 1954

Burton, Robert Eugene, Bldg. 407-4 Stanford Village, Stanford, Calif.

Darnall, Glenn McClellan, Jr., 229 West Blvd., New Plymouth, Idaho.

Gandiaga, Marguerite Ruth, 210 6th Ave. E., Twin Falls, Idaho.

Martin, Robert Charles, 355 S. Main, Logan, Utah.

Peterson, Linnea Leslie, 280 Oak Grove, Atherton, Calif.

Ransky, Robert, 431 Cedar Ave., Highland Park, N.J.

Sterne, Judith Wilford, 345 Green St., San Francisco 11, Calif.

Tenney, Janet Norma, 10 Taft Ave., White River Junction, Vt.

IMPORTANT CORRECTION

In the June, 1954 issue of the ARCHIVES, there were listed Congress members who were elected to membership in the American College of Physicians. Inadvertently, the name of Arthur S. Abramson, White Plains, N.Y., was omitted. The editorial staff regrets any inconvenience to Dr. Abramson resulting from this oversight.

LATIN-AMERICAN CONGRESS OF PHYSICAL MEDICINE

Through the courtesy of the Government of Peru, expressly, the National Academy of Medicine, the University of San Marcos Medical School, Department of Surgery, and the Hospital Obreros of Lima, Peru, the Latin-American Congress of Physical Medicine will hold its Sixth Congress meeting in Lima, Peru, February 11-25, 1955. This meeting is combined with the Pan-American Academy of General Practice and the Pan-American Association of Medical Specialties. Application should be made to Dr. Cassius Lopez de Victoria, Executive Director, 176 E. 71st St., New York 21, N.Y.

AMERICAN ACADEMY FOR CEREBRAL PALSY

The eighth annual meeting of the American Academy for Cerebral Palsy will be held on November 4, 5 and 6, 1954, at the Williamsburg Inn, Williamsburg, Va.

SEMINAR AT NEW YORK UNIVERSITY

A four weeks' course in "Advance Physical Rehabilitation Methods for Physical Therapists" will be conducted at New York University-Bellevue Medical Center. It is scheduled for the following dates: November 22 through December 17, 1954; February 7 through March 4, 1955 and May 2 through May 27, 1955. Four points University credit are allowed. Also offered is a three weeks' "Seminar in Physical Rehabilitation Methods for Nurses" on the following dates: October 25 through November 12, 1954; January 10 through January 28, 1955 and April 4 through April 22, 1955.

Applications and requests for further information should be submitted to Mrs. Edith Buchwald Lawton, Director, Rehabilitation Courses for Physical Therapists, Institute of Physical Medicine and Rehabilitation, 400 E. 34th St., New York 16, N.Y.

COMING MEETINGS

American Occupational Therapy Association: Thirty-seventh annual conference, Shoreham Hotel, Washington, D. C., October 16-22, 1954. Margaret D. Clarke, Publicity Chairman.

National Society for Crippled Children and Adults: Annual convention, Statler Hotel, Boston, Mass., November 3-5, 1954. Overall theme: Rehabilitation, with general sessions, institutes, seminars, workshops and roundtables on various specialized subjects. Lawrence J. Linck, Executive Director.

Bay State Society for the Crippled and Handicapped, Inc.: Fourth annual conference combined with annual meeting of National Society for Crippled Children and Adults. Charles S. Wilson, Executive Director.

POSTGRADUATE COURSES IN CEREBRAL PALSY

The College of Physicians and Surgeons, Columbia University, offers the following postgraduate courses in cerebral palsy for 1954-55: Physicians, October 11-29, 1954 and February 7-25, 1955. Occupational and Physical Therapists: October 11 - December 10, 1954 and February 7 - April 8, 1955. For further information, write to Office of the Dean, College of Physicians and Surgeons, 630 W. 168 St., New York 32, N.Y.

AMA SECTION OFFICERS

At the meeting of the Section of Physical Medicine and Rehabilitation, held at the AMA meeting in June, the following officers were elected: Chairman, Dr. William H. Schmidt, Philadelphia; Vice-Chairman, Dr. Frances Baker, San Mateo, Calif.; Secretary, Dr. Walter J. Zeiter, Cleveland; Delegate, Dr. Frank H. Krusen, Rochester, Minn.; Alternate Delegate, Dr. Arthur L. Watkins, Boston; Representative to Scientific Exhibit, Dr. Donald A. Covalt, New York City.

ARTHRITIS AND RHEUMATISM ASSOCIATION MEETS

The Cleveland Chapter and the regional members of the American Rheumatism Association will sponsor a conference devoted to the rheumatic diseases on November 10, 1954. Speakers and topics follow: "The Diagnosis of Rheumatic Fever," T. Duckett Jones, New York City; "The Prevention and Treatment of Rheumatic Fever," Charles H. Rammelkamp, Cleveland; "The Diagnosis and Treatment of Gout," Alexander B. Gutman, New York City; "The Diagnosis of Rheumatoid Arthritis," Charles L. Short, Boston, Mass.; "The Treatment of Rheumatoid Arthritis," William D. Robinson, Ann Arbor, Mich.; "The Nature and Treatment of Osteoarthritis," Walter M. Solomon, Cleveland, and "Rehabilitation of the Arthritic," H. Worley Kendell, Peoria, Ill.

Inquiries should be directed to William S. Clark, M.D., Chairman, 2073 Abington Rd., Cleveland 6, Ohio.

NORTH CAROLINA STATE REGISTRATION

An examination for registration under the North Carolina Practice Act will be given in Charlotte, N. C., on Friday, November 12, 1954. Application forms and further information may be obtained from Margaret L. Moore, Secretary of the State Examining Committee of Physical Therapists, North

Carolina Memorial Hospital, Chapel Hill, N. C.

RECENT PUBLICATIONS BY MEMBERS

Otto Glasser, with co-authors, "The Use of Radioactive Phosphorus in the Detection of Intraocular Tumors." Cleveland Clinic Quarterly, July, 1954.

Daniel Dancik, "The Chief, Physical Medicine and Rehabilitation, in a Large Neuropsychiatric Hospital." Department of Medicine and Surgery Information Bulletin, June, 1954.

Herman J. Flax, "The Rehabilitation of the Hemiplegic Veteran." Boletin de la Asociacion Medica de Puerto Rico, April, 1954.

Irving Tepperberg and Elemer J. Marjey, "Additional Clinical Observations of Ultrasound Therapy." Department of Medicine and Surgery Information Bulletin, June, 1954.

Eugene Neuwirth, with co-author, "Oto-neuro-ophthalmological Manifestations of Cervical Origin." New York State Journal of Medicine, July, 1954.

Jerome W. Gersten, "Effect of Adenosine Triphosphate, Creatine Phosphate, and Related Compounds on Contraction of Striated Muscle." American Journal of Physical Medicine, June, 1954.

Gordon M. Martin, with co-author, "An Evaluation of Conservative Treatment for Patients with Cervical Disk Syndrome." Proceedings of the Staff Meetings of the Mayo Clinic, June 2, 1954.

William J. Erdman II, "The Effect of Variations in Technique on Clinical Chronaxie Determinations." American Journal of Physical Medicine, June, 1954.

Jack Meislin, "The Psychiatric Sheltered Workshop." Journal of Rehabilitation, May-June, 1954.

Ernst Fischer, "Special Review. Basic Biological Effects of Ultrasonic Energy." American Journal of Physical Medicine, June, 1954.

Herman J. Bearzy, "Effective Care of the Hemiplegic." The Physical Therapy Review, July, 1954.

John H. Aldes, with co-authors, "Use of Ultrasonic Radiation in the Treatment of Subdeltoid Bursitis With and Without Calcareous Deposits." The Western Journal of Surgery, Obstetrics and Gynecology, July, 1954.

Herbert Kent, "Physical Medicine and Rehabilitation as a Hospital Service." American Practitioner Digest of Treatment, June, 1954.

Michael M. Dacso and Howard A. Rusk, "Clinical Problems in the Rehabilitation of Older Patients." New York State Journal of Medicine, January, 1954.

Hans Kraus, with co-author, "Minimum Muscular Fitness Tests in School Children." The Research Quarterly of the American Association for Health, Physical Education, and Recreation, May, 1954.

Frank H. Krusen, "Physical Medicine Versus Dieting for Obesity." American Journal of Nursing, April, 1954.

Samuel E. Bilik, "Prevention of Superimposed Disabilities." The New York State Journal of Medicine, June, 1954.

Jacob L. Rudd, "A City-Wide Rehabilitation Program." American Practitioner, Digest of Treatment, August, 1954.

Myron M. Schwarzschild, with co-authors, "Errors in Unipolar Limb Leads Caused by Unbalanced Skin Resistances, and a Device for Their Elimination." American Heart Journal, August, 1954.

APPARATUS ACCEPTED

The following information relative to apparatus accepted by the Council on Physical Medicine and Rehabilitation of The American Medical Association is reprinted, with permission, from the following issues of The Journal of The American Medical Association: June 19, June 26, July 10 and July 17, 1954.

A.C.M.I. Portable Electrosurgical Unit, Model C-350: American Cystoscope Makers, Inc., 1241 Lafayette Ave., New York 59.

The A.C.M.I. Portable Electrosurgical Unit, Model C-350, is a generator of high frequency currents for use in surgery. A source of 50 to 60 cycle alternating current at 115 volts is required for operation and the power consumption is 800 watts. The unit incorporates two distinct circuits: one yields a tube-generated current for cutting; the other utilizes a spark-gap to generate a current for coagulation.

The apparatus is contained in a carrying case and measures 35 by 46 by 21 cm. (13½ by 18 by 8½ in.). When packed for shipment it measures 48 by 57 by 38 cm. (19 by 22½ by 15 in.) and weighs 18 kg. (40 lb.). The shipping weight includes the following accessories: footswitch, chuck handle, cord for active terminal, cord for indifferent terminal (with indifferent plate), inlet cable, and a set of eight surgical electrodes.

The Council obtained evidence indicating that this apparatus was satisfactory for minor surgery, such as that performed in an office or clinic on ambulatory patients.

Audivox Hearing Aid, Model 71: Audivox, Inc., 123 Worcester St., Boston 18.

The Audivox Hearing Aid, Model 71, is a tubeless hearing aid containing three transistors. The power is supplied by two 1.25 volt mercury cells in series. It has no tone control but does have a telephone induction pickup.

The body of the instrument measures 75 by 45 by 20 mm. and weighs 92.5 gm. The earphone, receiver cord, and batteries bring the total weight to 131 gm.

Acousticon Hearing Aid, Model A-310: Dictograph Products Inc., 95-25 149th St., Jamaica 35, Long Island, N. Y.

The Acousticon Hearing Aid, Model A-310, contains one transistor and two vacuum tubes and is powered by a mercury type A-battery and a 15 volt B-battery. It is designed for either air or bone conduction.

The body of the instrument measures 64 by 23 mm. and weighs 72 gm. With earphone, receiver cord, A-battery and B-battery, the total weight is 110 gm.

S. & L. Enuresis Alarm, Model DP: S. & L. Signal Co., 525 Holly Ave., Madison 5, Wis.

The S. & L. Enuresis Alarm, Model DP, an electric device used in the treatment of enuresis, sounds an electric bell when the bed pad is wet by the patient.

This model differs from the previously accepted S. & L. Enuresis Alarm, Model D, in the following respects. The pads that are placed under the patient are made of a black conductive fabric (instead of a wire screen). The upper pad has small perforations (about 2 mm. in diameter and about 1 cm. apart) over its entire area except near the margins; the two pads are separated by a sheet of flannel. The bed pad cord is permanently attached to the control box (instead of using a jack as does Model D).

The conductive pads measure 66 by 48 cm. (26 by 19 in.); the control box measures 21.5 (height) by 13 by 20 cm. (8⅜ by 5 by 7⅞ in.). Packed for shipment the complete apparatus measures 15 by 53 by 30.5 cm. (6 by 21 by 12 in.) and weighs 5.9 kg. (13 lb.). For operation the unit requires one 6 volt A-battery, which rings the bell, and one 22.5 volt B-battery, which supplies the circuit through the pads. The latter circuit becomes effective when the resistance between the pads falls below 500 or 600 ohms; the relay then activates the bell circuit.

The Council obtained evidence indicating that this device was effective when proper physical and psychological examination of the patient had eliminated anatomical defects or unfavorable influences in the environment as possible factors in the enuresis and that the apparatus was safe to use under medical supervision.

A. C. M. I. Diathermy Unit, Model VC 4000 M: American Cystoscope Makers, Inc., 1241 Lafayette Ave., New York 59.

The A. C. M. I. Diathermy Unit, Model VC 4000 M, is designed to generate short-wave radiation of a frequency of 27.12 megacycles (corresponding to a wave length of 11.06 m.) for both medical and electrosurgical purposes. The unit is housed in a metal cabinet and mounted on casters; the over-all dimensions of the unit are 103 (height) by 59 by 37 cm. (40½ by 23 by 14½ in.), and weighs 84 kg. (185 lb.). Packed for shipment it weighs 123 kg. (270 lb.) and measures 117 by 69 by 51 cm. (46 by 27 by 20 in.).

The shipping weight includes the following accessories: induction drum applicator with universal arm, inductance cable 3.6 m. (12 ft.) long, set of surgical electrodes, rubber-covered indifferent (dispersive) plate, set of five cable clips, concave inductor, chuck handle and cord, inlet cable, and footswitch. This apparatus has Type Approval D 549 of the Federal Communications Commission. The output is about 275 watts and the power consumption is given as 1,150 watts.

Whitehall Hydromassage Underwater Therapy Unit for Full Body Immersion, Model JO-400: The Whitehall Electro Medical Co., Inc., 19 Wall St., Passaic, N.J.

The Whitehall Hydromassage Underwater Therapy Unit for Full Body Immersion, Model JO-400, is a stainless steel tank, described as a modified Hubbard tank, that is designed for permanent installation in a department of hydrotherapy. It is shaped so that, when the patient's trunk and extremities are entirely immersed, he can extend and abduct his legs and execute a complete range of arm movements.

This model, when shipped complete with all accessories, includes a body stretcher, body plinth, overhead electric hoist, two turbine ejector-aerator assemblies, two raising and lowering assemblies, adjustable head rest, thermostatic water-mixing valve assembly, plumbing fittings, legs, couplings, spare canvas, crossbar with cable suspensions and snap-hooks, body sling, and body hammock.

The over-all length of the tank is 267 cm. (8 ft. 9 in.); the over-all width is 193 cm. (6 ft. 4 in.); inside depth is 56 cm. (22 in.), and the capacity is 1,500 liters (400 gal.). The two turbine ejector-aerator assemblies are each equipped with a one-half horsepower motor that operates on 60 cycle alternating current at 110 to 115 volts and consumes 675 watts.

Ille Thermostatic Folding Bed Tent, Model BT 100: Ille Electric Corporation, 50 Mill Rd., Freeport, Long Island, N.Y.

The Ille Thermostatic Folding Bed Tent, Model BT 100, is a device for holding the bed coverings out of contact with a patient's feet while giving radiant heat treatment to the lower extremities. It can be extended for treatment of the entire body, or may be used for the upper extremity. The framework is made so as to fold easily. The heat, supplied by two carbon filament lamps, is

thermostatically controlled. Metal guards protect the patient from burns that might result from contact with the lamps. A source of 60 cycle alternating current at 115 volts is required, and the power consumption is 125 watts.

The assembly weighs 4.5 kg. (10 lb.). When packed for shipment it measures 15 by 122 by 76 cm. (6 by 48 by 30 in.) and weighs 23 kg. (50 lb.).

General Electric Cardioscribe, Model DWB-1 (Portable Direct-Writing): General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14.

The General Electric Cardioscribe, Model DWB-1, Direct-Writing Electrocardiograph uses a heated stylus on heat-sensitive paper. It is housed in a portable carrying case, weighs 17.7 kg. (39 lb.), and measures 19 by 45 by 33 cm. (7½ by 17½ by 13 in.). Packed for shipment it weighs 22.8 kg. (50 lb.) and measures 28 by 51 by 38 cm. (11 by 20 by 15 in.). Accessories include a patient cable, chest electrode, extremity electrodes and straps, line cord, ground wire, roll of record paper, tube of electrode paste, and operating instructions.

The instrument requires 60 cycle altrenating current at 105 to 130 volts and draws 110 watts. Models are also available for operation on 50 cycle current.

American Congress of Physical Medicine and Rehabilitation

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APPLICATION FOR MEMBERSHIP

Date.....

Name of Applicant .....
Please Print (Last Name) (First Name) (Middle Name)

Present Address .....
(Street)

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(City) (Zone) (State) (County)

1. Age.....Date of Birth.....Place of Birth.....
2. Medical School and Year Graduated.....
3. Licensed in State of.....In Year of.....
4. I am a member in good standing of the.....
   County Medical Society, State of.....
   THE NAME AND ADDRESS OF THE SECRETARY.....
   OF THE COUNTY MEDICAL SOCIETY IS.....
5. Active member of the following Medical Societies.....
   (Including other Special Societies)

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Signature of Applicant (In Ink)

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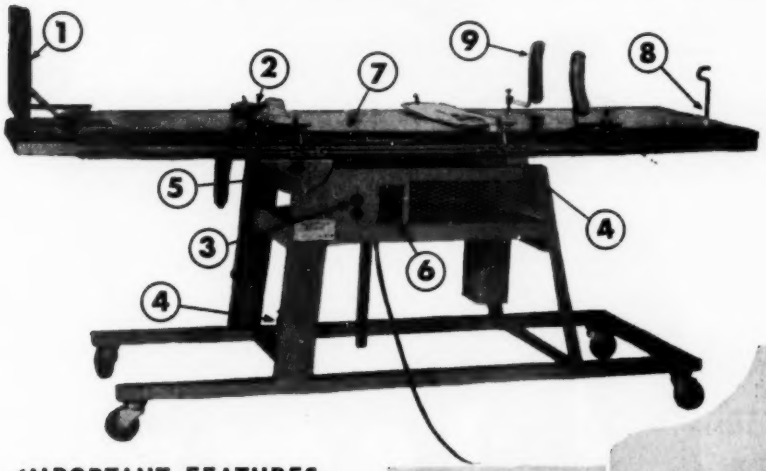

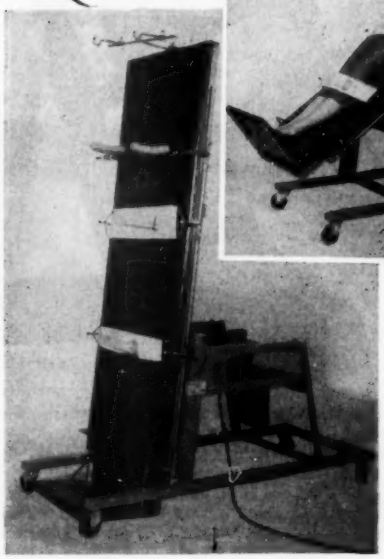

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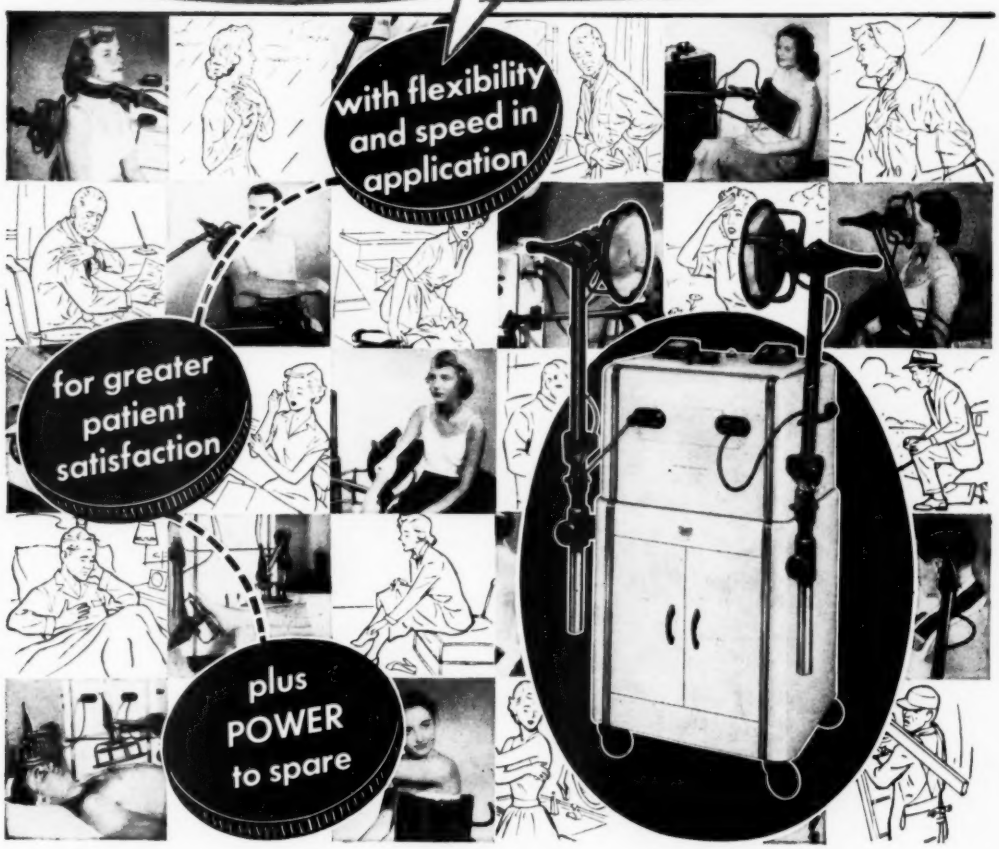

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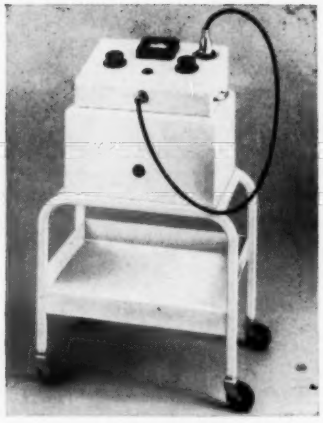

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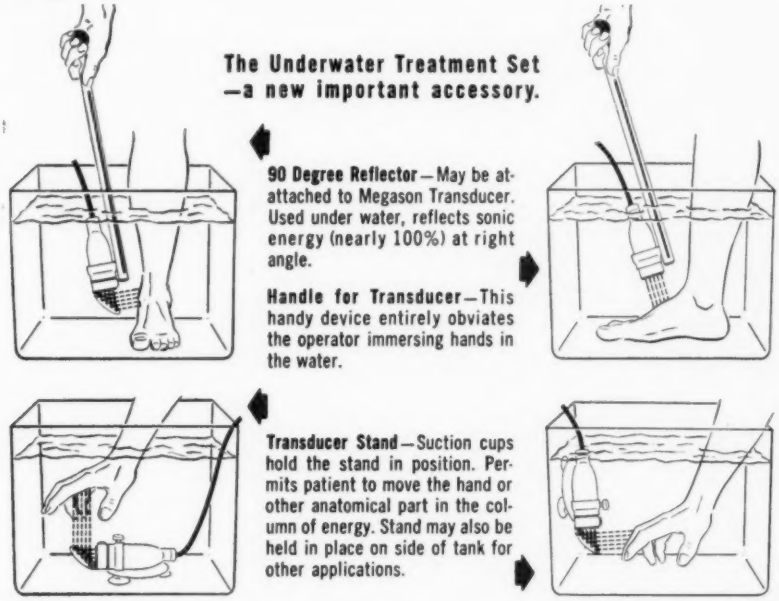

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